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GROUND WINDS FOR KENNEDY SPACE CENTER, FLORIDA (1978 VERSION)

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FOREWORD

This revised document was required because 6.5 additional years of peak wind information was available for incorporation into the existing 12.5-year Kennedy Space Center peak wind data sample. Also, newer programs were written which calculated headwind and tailwind statistics separately. This document supersedes NASA CR-128995 and should be used in place of it.

TECHNICAL MEMORANDUM 78181

GROUND WINDS FOR KENNEDY SPACE CENTER, FLORIDA (1978 VERSION)

I. INTRODUCTION

This report deals with surface-level wind conditions for NASA's Kennedy Space Center (KSC), Florida, including the Cape Canaveral, Florida, area. Since KSC will be the primary landing site after the first four Orbital Flight Tests of the Space Shuttle, these statistics may prove useful in mission planning activities. This report presents low-level crosswind, headwind, tailwind, and headwind reversal statistics by hour and month for use with the main KSC Shuttle runway orientation.

The winds were recorded at the Cape Canaveral Air Force Station (CCAFS). In March 1978 the wind observation site was moved to the Shuttle runway. Even though the Shuttle runway (approximately 11.5 miles northwest of the CCAFS wind observation site) may exhibit some differences in the wind regime — perhaps more thunderstorms or different sea-breeze effects — the wind statistics presented provide the best available mission planning information to date. This document supersedes NASA CR-128995 and should be used in place of it.

II. ARRANGEMENT OF TABLES

Tables are numbered and arranged by monthly reference period, with subnumbers used to identify the crosswind, tailwind, headwind, or reversal statistics within each month as follows:

Section III

Crosswind: Tables 1.1 through 13.1

Tailwind: Tables 1.2 through 13.2

Crosswind versus Tailwind: Tables 1.3 through 13.3

Headwind Reversals: Tables 1.4 through 13.4

Headwind: Tables 1.5 through 13.5.

III. RUNWAY CROSSWINDS, TAILWINDS, AND HEADWIND REVERSALS

A. Background

A study similar to the one presented here was previously done for the NASA/KSC, Florida area in October 1972 [1]. That study used hourly peak ground wind data to determine optimum runway orientation by minimizing critical high crosswind component frequencies. The proposed runway orientation was then used in conjunction with the hourly peak wind data to determine frequencies of headwind-to-tailwind reversals that resulted in specified tailwind speeds. The present KSC wind study expands on the two types of information determined previously for KSC and adds a section on tailwinds and headwinds alone. This type of runway wind study was also completed for the Edwards AFB area [2].

B. Runway Orientation

The runway of interest for NASA Shuttle Orbiter landings at KSC is Space Shuttle runway 15-33 (150-330 degrees). Figure 1 is an artist's conception of the Space Shuttle Orbiter making its final approach (toward the north) onto the KSC runway end 33 after completing a space mission. Figure 2 indicates the general layout of the Shuttle runway. The runway is designated 15-33 because of its angle of separation in degrees clockwise from magnetic north and indicates a pilots approach toward that direction. That is, a pilot desiring to land toward the south on 15-33 would enter from the north end (15), thereby allowing him to land toward 150 degrees. The runway orientation with respect to true north is within 0.5 degree of magnetic north. All magnetic runway wind statistics given in this report were computed with respect to true north.

The Shuttle runway is oriented so that a vehicle landing from the northwest toward the southeast will probably be landing into a headwind during the summer months. Figure 3 [3] gives the prevailing surface wind direction versus hour and month. The respective percentages of the prevailing direction are given within each box. These prevailing KSC wind directions were developed by using

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Figure 1. Space Shuttle Orbiter landing on runway 33 at KSC, Florida.

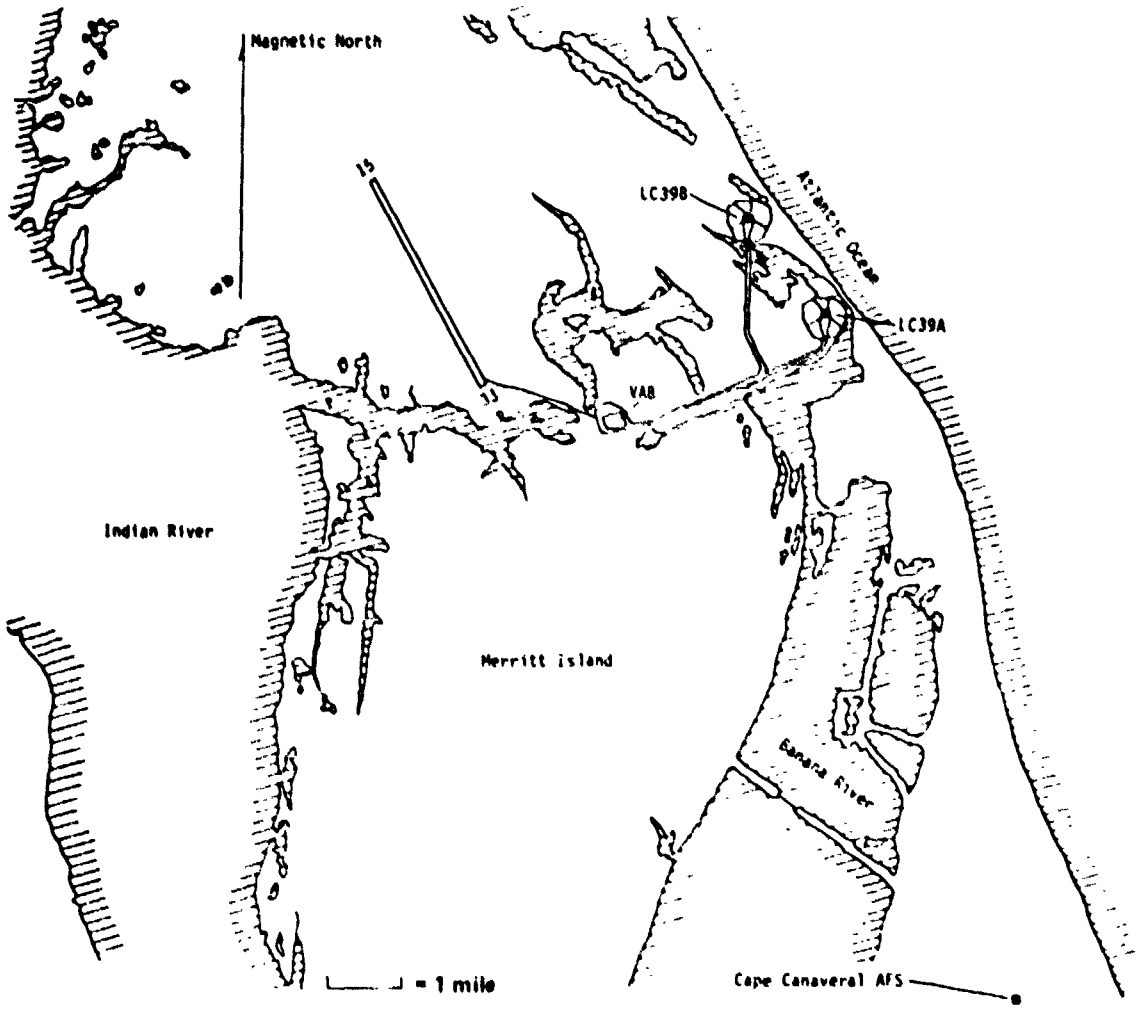

Figure 2. KSC Space Shuttle runway 15-33.

hourly mean values. Generally, a 1-minute average is taken about each hour. From Figure 3 one can see that runway 15 headwinds (winds from east through south) prevail from April through September for most all hours of the day. Headwinds for runway 33 (winds from the northwest and north) prevail in the winter for most all hours from November through February, with March and October classified as transition months. Mean hourly surface wind speeds (in knots) versus hour and month are given in Figure 4 [3]. It can be seen that wind magnitudes generally pick up during the afternoon hours [1200-1700 local standard time (LST)], with larger magnitudes generally observed during the fall, winter, and spring months.

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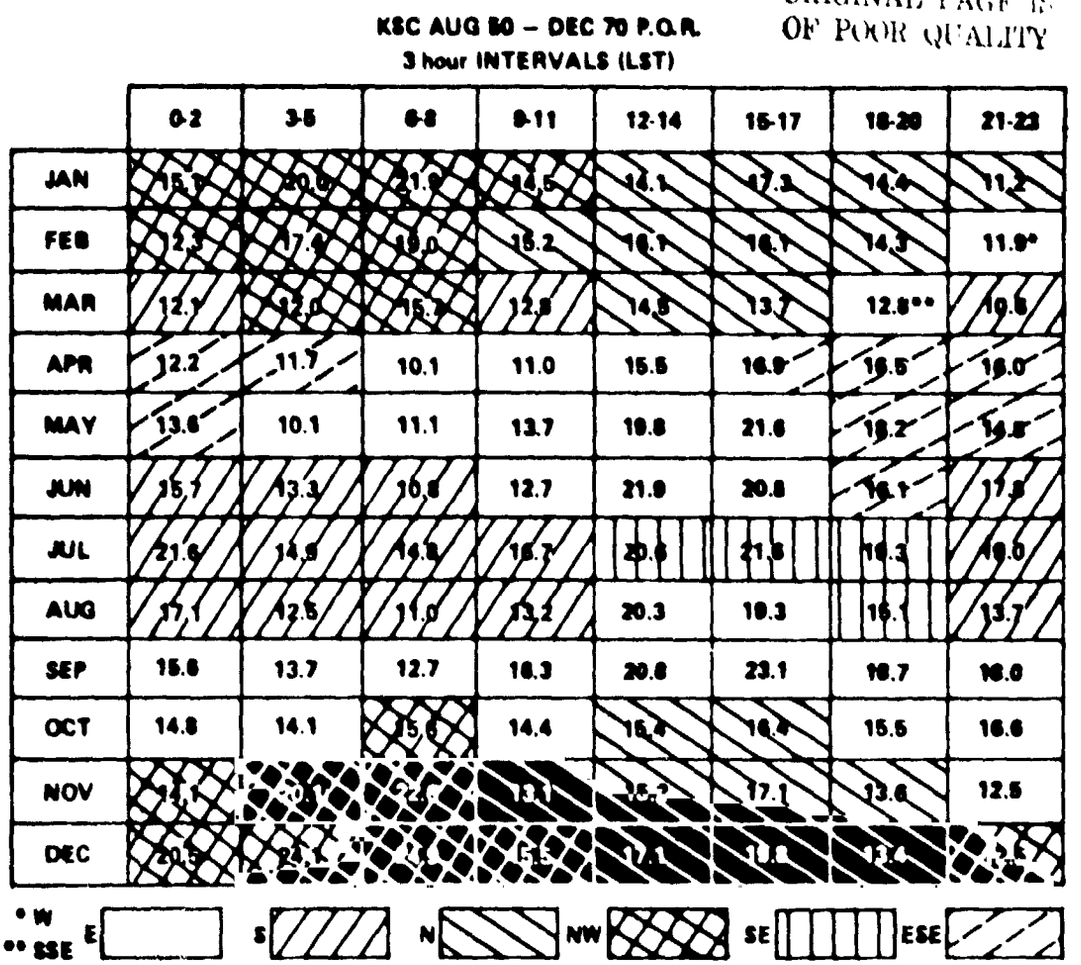

Figure 3. KSC percentage of prevailing wind direction.

C. Data Used

The ground wind speed and direction data used in this study were taken from a magnetic tape containing the CCAFS hourly surface peak wind observations (similar to Reference 4). The period of record extended from September 1958 through December 1977. The tape gave a total of 159,938 hourly peak wind observations for KSC, Florida. All calms were included in the data sample. The hourly peak wind sample used here is the peak wind speed (and associated direction) observed between 30 minutes prior to and 30 minutes after the hour. Speeds were read to the nearest whole knot, directions to the nearest degree. During the period of record the anemometer location was changed several times. However, most of the observations were made approximately 10 meters (33 feet)

KSC P.O.R. AUG 50 - DEC 70

3 hour INTERVALS (LST)

	0-2	3-5	6-8	9-11	12-14	15-17	18-20	21-23
JAN	6.6	6.7	6.7	8.8	10.1	9.1	6.7	6.7
FEB	7.1	6.9	7.2	9.8	11.0	10.4	7.7	7.2
MAR	6.9	6.7	7.1	10.0	11.2	10.7	7.8	7.2
APR	6.8	6.3	6.9	9.7	10.8	10.7	7.9	7.2
MAY	5.8	5.2	6.2	8.7	10.1	10.2	7.7	6.5
JUN	5.1	4.3	5.0	7.6	9.4	9.2	6.9	5.6
JUL	4.3	3.7	4.3	6.9	8.7	9.0	6.2	4.7
AUG	3.8	3.5	4.0	6.8	8.5	8.3	5.5	4.3
SEP	6.0	[illegible]	[illegible]	[illegible]	[illegible]	9.0	7.0	6.4
OCT	6.8	6.7	7.1	9.4	10.1	9.4	7.5	7.2
NOV	6.7	6.5	6.7	8.9	9.7	8.4	6.6	6.7
DEC	6.4	6.4	6.4	8.8	10.0	8.5	6.3	6.4

Figure 4. KSC mean surface wind speed (knots).

above natural grade. In Space Shuttle vehicle ground wind related analyses, peak wind speeds (or gusts) are generally more useful in design, mission planning, and operational activities.

D. Computational Methods/Equations

1. Crosswind Procedure. This section includes a discussion of the computational methods used in obtaining the percentage frequency of occurrence within critical crosswind intervals, i.e., 1 to 4, 5 to 9, 10 to 14, 15 to 19, 20 to 24, and 25-up knots. The crosswind equation used for the runway is:

$$\text{Crosswind} = (\sin |\, WD-RA \,| \times WS) \qquad (1)$$

where

RA = runway angle measured from true north

WD = wind direction in degrees clockwise from true north

WS = wind speed in knots.

The runway crosswind component for each observation was computed and then checked against the several critical crosswind intervals, and a tally was entered into the appropriate matrix position. Every wind observation (159,938 total observations) was handled in this manner.

The percentage frequency of occurrence of crosswind components within these critical intervals was next calculated for each matrix position by dividing the total number in that position by the total number of observations and multiplying by 100; i.e.,

$$\text{Percent frequency} = (S/T) \times 100 \qquad (2)$$

where S is the number of cases within the critical crosswind interval and T is the total number of wind observations for that time interval. These runway crosswind percentage frequencies are given by month in Tables 1.1 through 13.1 for each 3 hour period of the day.

2. Tailwind Procedure. In addition to critical crosswinds adversely affecting the landing of space vehicles and aircraft, headwind reversals (i.e., a headwind changing to a tailwind) also can present problems. Given in this section are percent frequency of occurrence tables that pertain to critical tailwind and tailwind crosswind speeds. The crosswind computations discussed in the last section of this report do not require a specification of the landing direction since a wind component is calculated normal to the runway. This means that a critical crosswind that affects the vehicle from either the left or right side is tallied. However, in analyzing headwinds and tailwinds, the direction of the component parallel to the runway is important. If, for example, it were necessary to land on runway 15 (from northwest), a wind component from the northwest (a tailwind) would be unfavorable. In the computations performed here, parallel runway winds were computed using the following formula:

$$\text{Parallel wind} = \{\cos \mid \text{WD-RA} \mid \times \text{WS}\} \qquad (3)$$

where

RA = runway angle measured from true north

WD = wind direction in degrees clockwise from true north

WS = wind speed in knots.

When computing a parallel runway wind, sign is important. If equation (3) gives a positive velocity (+), it defines a tailwind. Conversely, a negative velocity (-) defines a headwind. Critical tailwind interval limits of 1 to 4, 5 to 9, and 10-up knots were used by hour and month in computing the runway tailwind probabilities as given in Tables 1.2 through 13.2. Finally, crosswind-versus-tailwind percentages are given in Tables 1.3 through 13.3 by month and hour for each runway.

3. Headwind Reversal Procedure. In this analysis of runway headwind components an attempt has been made to answer some basic questions concerning 1 hour wind reversal frequencies. For example, (1) What is the probability that the wind component parallel to the runway will reverse direction? (2) Do reversals from northwest to southeast components occur as frequently as southeast to northwest changes? (3) Suppose the wind direction at some specified time is known; what then is the conditional probability of a reversal?

a. Frequency of Wind Reversals. To calculate this value it is only necessary to count those cases when the parallel wind component switches from one hour to the next; i.e., if the component goes from (+) to (-) or from (-) to (+), this indicates a switch and is tallied. Dividing this tally by the entire hourly data sample gives a percent frequency (occurrence rate) of the wind reversing on the runway over that time interval. This procedure is expressed in equation (4) as follows:

$$X(I,J) = \frac{100\ Y(I,J)}{Z(I,J)} \qquad (4)$$

where

X(I,J) = percent frequency of parallel component wind reversal for month I and time period J

$Y(I,J)$ = number of occurrences of parallel wind reversals during month I and time period J

$Z(I,J)$ = total observations during month I and time period J.

The reversal tallies were entered on the resulting hour; i.e., a reversal wind between 0700 and 0800 LST is entered at 0800 LST (the resulting time). However, since hours are combined into time intervals, this was entered as a tally within the 06-08 3 hour time interval. These values are listed in column 1 (TOTAL) of Tables 1.4 through 13.4A.

b. Southeast to Northwest and Northwest to Southeast Reversals. How often does a southeast wind component reverse to a northwest wind component from 1 hour to the next? To compute these reversals, the number of southeast to northwest component changes are tallied and then divided by the total number of observations for that time period. These values appear in column 2 (HEAD-TAIL) of Tables 1.4 through 13.4A for runway 15 but in column 3 (TAIL-HEAD) for runway 33. Wind component changes from northwest to southeast are calculated in the same way.

c. Conditional Wind Reversals. Given a southeast parallel component wind initially, how often does this southeast wind change into a northwest wind component by the next hour? This third question deals with the conditional statement that given a southeast wind, what is the probability of its changing into a northwest wind; i.e., P(NW|SE). In this third question we must look at only the hourly southeast components in the data sample and then tally the southeast to northwest wind changes over an hour. This tally must be divided by the number of southeast wind components in the sample, not by the total data sample, because prior knowledge of the wind direction is assumed (i.e., southeast winds are set as given initially). See columns 4 and 5 of Tables 1.4 through 13.4A. Likewise, column 5 presents the conditional percentage frequency of a northwest to southeast reversal by using the same method.

In this section the following conditional probability equation was used:[1]

$$P(X|Z)_{ij} = \frac{100\ Y(I,J)}{Z(I,J)} \qquad (5)$$

1. The terminology given here is reversed when considering the probability of a headwind given a tailwind.

where

$P(X|Z)_{ij}$ = conditional probability of the occurrence of a tailwind (X) given a headwind (Z) initially during month I and time J

Y(I,J) = the number of headwind-to-tailwind changes during month I and time period J

Z(I,J) = the total number of headwinds in the month I/time J data sample.

Tables 1.4B through 13.4B also give headwind reversal statistics, but here the statistics are broken out into specified resultant tailwind magnitude categories (i.e., resultant tailwinds of >0-3, 4, 8, >8 knots).

Throughout this headwind reversal section both calm conditions and direct crosswinds were considered as favorable landing conditions.

4. Headwind Component Procedure. Headwind component statistics parallel to the runway are often requested. Computed in Tables 1.5 through 13.5 are cumulative percentage frequencies of headwind components calculated along the runway during daytime hours (06-17 hours). These tables were computed by equation (3), using only those wind observations that displayed a headwind component along the specified runway. This means that for the runway 15 computations, for example, all observations of wind directions from approximately west through north to east (tailwind components) were eliminated. This accounts for the lower number of total observations given in the tables. The component speed column should be interpreted as follows: 0-1 includes speeds from 0 to 0.9 knot; 1-2 contains values from 1.0 to 1.9 knots, etc. Calms are included in the zero category.

E. Explanation of Tables

Tables 1.1 through 13.1, 1.2 through 13.2, and 1.3 through 13.3 of this report are presented as percentages of crosswinds or tailwinds within selected wind speed intervals only. Since probability questions of the type "greater than or equal to a certain value" are usually asked (indicating an accumulated effect), one must add together rows of percentages and, at times, columns as well. Tables 1.4A through 13.4A give the percent of wind reversals for "all" resultant tailwind (or headwind) magnitudes, whereas Tables 1.4B through 13.4B break out the reversal statistics into specified tailwind categories.

The critical crosswind or tailwind speed interval headings, 1 to 4, 5 to 9, etc., are to be interpreted as 1 through 4 knots, 5 through 9 knots, etc. Also, zero crosswinds are classified as all winds that are (1) calm, (2) < 1 knot, and (3) parallel to the runway. Zero tailwinds have not been tabulated, but all tailwinds > 0 knots and < 1 knot were placed within the 1 to 4 knot classification interval during data analysis. The time intervals given (i.e., 00-02, etc.) indicate eight 3 hour intervals, and they are expressed in LST.

1. Crosswind Example. Tables 1.1 through 13.1 give percentages of critical crosswind occurrences within critical crosswind speed intervals versus hour of day for the runway and month. Since runway end number does not matter when computing crosswinds, the runway is listed as 15-33 on these tables. Examples follow concerning the use of Tables 1.1 through 13.1 in which crosswind occurrence percentages can be easily calculated by summing up percentages in the appropriate row. For runway 15-33 between hours 00-02 for the April reference period, Table 4.1 gives a 45.31 percent chance of encountering a crosswind ≥ 5 knots. One must add 40.80 + 3.33 + 0.68 + 0.25 + 0.25 = 45.31. This also means that 54.69 percent (i.e., 50.99 + 3.70 = 54.69) of the crosswinds are < 5 knots. Similarly, crosswind percentages ≥ 20 knots can be computed for all hours on runway 15-33 by adding, on the 00-23 line (under HRS), 0.36 + 0.30 to arrive at a percentage of 0.66. In this same category, zero crosswinds (calm conditions, crosswinds < 1 knot, or winds parallel to the runway) occur 2.18 percent of the time.

2. Tailwind Example. Tables 1.2 through 13.2 give percentage frequencies of tailwind components within critical tailwind speed intervals versus hour of day for the runway heading and month. Since landing direction does play a part in the computation of tailwinds (or headwinds), the runway is listed as 15 and 33, indicating the approach direction (i.e., 15 is landing into 150 degrees from the northwest end of the runway). Some examples follow that indicate the use of Tables 1.2 through 13.2. Again, the format of the tables is similar to that of Tables 1.1 through 13.1, and the tailwind statistics presented are not accumulated. The April tailwind percentage ≥ 5 knots between 00-02 hours LST for runway 15 as presented on the left side of Table 4.2 is 0.87 (0.62 + 0.25 = 0.87). The companion table of 4.2 indicates a tailwind percentage of 78.71 for runway 33 for the same specified conditions. The 78.71 percent on runway 33 can also be interpreted as the percentage of headwinds on runway 15. A tailwind on one runway heading (33) is a headwind on the other end of the runway (15). Combined percentiles for all hours can be obtained from the 00-23 row.

Tables 1.3 through 13.3 give percentages for the joint occurrence of winds within selected crosswind versus tailwind speed intervals. These monthly tables are presented for each end of the runway and are displayed by hour of day (LST). Tables 1.3 through 13.3 offer the advantage of obtaining percentages by choosing the critical crosswind and tailwind limits concurrently, not separately. That is, suppose both crosswinds and tailwinds ≥ 5 knots are critical to a landing operation for 00 hours during April on runway 15, one would find the intersection number that pertains to the intervals of crosswind 5 to 9 and tailwind 5 to 9. In this case, the number in Table 4.3 is 0.56 percent. This is not the percentage number needed since these table percentages, again, are not accumulated. Therefore, one must sum all the tailwind rows ≥ 5 knots that encompass all crosswind values ≥ 5 knots. This will satisfy the required condition. Figure 5 illustrates the Table 4.3 example in more detail in that the percentage numbers to be added are enclosed by dashed lines. The total required sum of these ten numbers is 0.94, which is the required percentage.

RUNWAY 15, HOUR 0, KSC, FLORIDA, APRIL

TAILWIND LIMITS	CROSSWIND LIMITS 1-4	5-9	10-14	15-19	20-24	25-UP	ZERO CROSS	TOTAL[2]
1-4	1.11	0.74	0.00	0.00	0.00	0.00	0.00	1.86
5-9	0.00[a]	0.56	0.19	0.00	0.00	0.00	0.00	0.74
10-UP	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.19
TOTAL	1.11	1.30	0.19	0.19	0.00	0.00	0.00	2.78

a. TOTAL PERCENTAGES WITHIN DASHED (--) AREA = 0.94 PERCENT.

Figure 5. KSC crosswind tailwind speed interval percentages.

Since Tables 1.3 through 13.3 are the most involved of the tables presented thus far, a few notes of caution are issued that one should remember while using them. The total row and column offer a sum of all rows or columns, respectively. The total column (of Tables 1.3 through 13.3) has also added into it all the zero crosswind percentages. The percentage numbers enclosed by asterisks in Figure 5 show the percent frequency of tailwinds without regard to crosswind components. An example of using the total row follows. If one needs the percentage of all crosswinds ≥ 5 knots on runway 15 at 00 hours in April which encompasses all tailwind categories, he can sum the numbers 1.30, 0.19, 0.19, 0.00, and 0.00 to arrive at 1.68 percent. Why is this value so much less

2. The tabular numbers may not total exactly because of computer round-off.

than the 45.31 00-02 hour percentage of crosswinds > 5 knots on runway 15-33 from Table 4.1? The answer is that the 1.68 percent corresponds to crosswinds ≥ 5 knots with regard to all tailwind categories. Tables 1.1 through 13.1 give crosswinds ≥ 5 knots with regard to all parallel winds (tail and head combined). To obtain comparable numbers, one must calculate from Table 4.3 the crosswind percentage ≥ 5 knots (44.45 percent) with regard to all tailwinds on runway heading 33 (a headwind on runway 15) and add the two percentages (1.68 + 44.45) to arrive at 46.13 percent, which corresponds closely to Table 4.1 values. The numbers will not be exact because Tables 1.1 through 13.1 and 1.2 through 13.2 give statistics in 3 hour groups, while Tables 1.3 through 13.3 are by each individual hour. Both tailwinds and headwinds from Tables 1.3 through 13.3 may have to be used depending upon the application.

3. Headwind Reversal Example. Tables 1.4A through 13.4A give the percentage of parallel runway wind reversals that answer the three questions posed earlier in this report concerning different runway wind reversal classifications. These tables present the probabilities for each runway end by month and 3 hour time period. Column 1 answers question 1 and gives the total reversals for all observations (within time and month category). Columns 2 and 3 answer question 2 by giving the percent frequency of headwind-to-tailwind and tailwind-to-headwind reversals, respectively, for all observations. Question 3 on conditional probability is answered in columns 4 and 5. It should be noted that the statistics presented in Tables 1.4A through 13.4A deal with the probability of reversals without regard to the resulting parallel-wind magnitude classification, as presented in Reference 1. This means, for example, that the columns regarding headwind-to-tailwind reversals (columns 2 and 4) were computed for all resultant tailwind components. On the "A" tables, all magnitudes of the resultant tailwinds were combined before the statistics were computed. However, Tables 1.4B through 13.4B present these same reversal statistics with respect to different categories of the resultant tailwind magnitudes.

These statistics should prove valuable to both the mission planner and the operational control authority because they are based upon a prior knowledge of the wind-type information that will be available during the mission. For example, consider a landing planned for 1000 LST in April on runway 15. Assume that the wind observed at 0900 LST is known to have a headwind component along that runway. Table 4.4A, column 4, indicates that 2.36 percent of those wind observations changed to such an extent that at the following hour (1000 LST) there was a tailwind component on runway 15. This percentage can also be obtained from the appropriate total column of Table 4.4B. Restated in terms of risk: with a known headwind component at 0900 LST, the risk of change to a tailwind component at 1000 LST is approximately 2 percent. Of course, this risk statement does not consider the forecast capability that would be utilized in the real-time operation.

If the investigator were interested in the percent of headwind reversals of all reversals which resulted in a tailwind of ≥ 4 knots, this can be obtained from Table 4.4B by adding 1.31 and 0.98 to arrive at 2.29 percent.

4. Headwind Component Example. Tables 1.5 through 13.5 give cumulative percentage frequencies of headwind components along the runway during the daytime hours. The use of the tables is illustrated by the following example: "What is the risk of a headwind component ≥ 15 knots on runway 15 at 12-14 hours in April?" Table 4.5 shows that 91.25 percent of the headwind observations were ≤ 20.9 knots. Conversely, there is a 8.75 percent risk of speeds ≥ 21 knots. "What is the 95 percentile headwind component speed from the same table?" Interpolation between 94.21 and 95.47 for 95 results in a speed of approximately 22 knots.

IV. CONCLUSION

In summary, this report provides different types of wind statistics applicable to the KSC, Florida area. Ground-level wind statistics are given computed with regard to the KSC Space Shuttle runway orientation. Crosswinds, tailwinds, headwinds, and headwind reversals are the different parameters computed by critical class intervals for hour, month, and runway. If cumulative percentage results are needed, one must follow the procedures given in this report and accumulate the appropriate percentages. The reader should consult Reference 1 for a further discussion concerning some small sources of error introduced by the use of peak wind data samples.

Further climatological and wind information involving the KSC area can be obtained from References 5 through 8.

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JANUARY

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TABLE 1.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF JAN.

RUNWAY 15 - 33

HRS	CROSSWIND ***** CRITICAL LIMITS IN KNOTS ***** 1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	47.61	31.42	5.85	2.63	.90	.06	11.53	1674
03-05	46.71	30.05	7.11	3.05	1.19	.18	11.71	1674
06-08	43.31	32.74	7.65	2.69	.90	.18	12.54	1674
09-11	25.69	45.52	12.07	5.85	1.61	.18	9.08	1674
12-14	19.77	51.31	12.01	5.85	2.27	.54	8.24	1674
15-17	27.08	49.07	10.22	3.95	1.43	.18	8.07	1673
18-20	48.45	31.42	6.27	2.57	.72	.12	10.45	1674
21-23	47.07	33.21	4.12	1.81	.66	.12	12.01	1674
00-23	38.21	38.09	8.16	3.67	1.21	.19	10.45	13391

TABLE 1.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF JAN.

HRS	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	4.66	3.46	1.97	1674	24.49	30.59	26.58
03-05	5.20	3.76	2.15	1674	25.69	29.51	24.67
06-08	5.44	3.76	2.57	1674	26.58	26.88	25.63
09-11	2.33	7.35	3.82	1674	11.17	21.51	45.70
12-14	.72	5.02	5.68	1674	4.96	19.06	56.63
15-17	.72	3.89	4.90	1673	4.60	28.81	49.25
18-20	4.72	5.50	2.81	1674	21.03	30.65	26.94
21-23	5.97	4.54	1.97	1674	21.92	29.09	28.02
00-23	3.72	4.66	3.23	13391	17.56	27.01	35.43

TABLE 1.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 0 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.15	2.87	.00	.00	.00	.00	.00	5.02 *	16.67	3.76	1.43	.54	1.08	.00	.72	24.19
5 TO 9	.00	.90	1.25	.72	.00	.00	.00	2.87 *	27.78	.90	.00	.36	.00	.00	1.61	30.65
10- UP	.00	.00	.72	.36	.18	.00	.00	1.25 *	.72	24.55	1.79	.00	.00	.00	.18	27.24
TOTAL	2.15	3.76	1.97	1.08	.18	.00	.00	9.14 *	45.16	29.21	3.23	.90	1.08	.00	2.51	82.08

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 1 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.15	2.15	.00	.00	.00	.00	.00	4.30 *	17.38	3.41	1.61	.54	.36	.18	1.43	24.91
5 TO 9	.00	1.61	.72	1.43	.00	.00	.00	3.76 *	27.78	.72	.18	.00	.00	.00	1.43	30.11
10- UP	.00	.00	1.43	.36	.18	.00	.00	1.97 *	1.25	23.12	2.15	.00	.00	.00	.36	26.88
TOTAL	2.15	3.76	2.15	1.79	.18	.00	.00	10.04 *	46.42	27.24	3.94	.54	.36	.18	3.23	81.90

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 2 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.61	2.87	.00	.00	.00	.00	.18	4.66 *	15.95	3.41	1.43	1.08	.54	.00	1.97	24.37
5 TO 9	.00	1.43	.90	1.25	.18	.00	.00	3.76 *	28.14	.72	.36	.00	.00	.00	1.79	31.00
10- UP	.00	.00	1.25	1.25	.18	.00	.00	2.69 *	1.25	21.86	2.33	.00	.00	.00	.18	25.63
TOTAL	1.61	4.30	2.15	2.51	.36	.00	.18	11.11 *	45.34	25.99	4.12	1.08	.54	.00	3.94	81.00

TABLE 1.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 3 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	1.61	3.41	.00	.00	.00	.00	5.02	•	15.95	3.23	1.79	.90	.54	.18	1.79	24.37
5 TO 9	.00	1.25	1.25	.90	.18	.00	.00	3.58	•	29.03	.72	.00	.36	.00	.00	1.79	31.90
10- UP	.00	.00	1.25	.36	.36	.00	.00	1.97	•	1.08	20.43	2.15	.18	.00	.00	.00	23.84
TOTAL	1.61	4.66	2.51	1.25	.54	.00	.00	10.57	•	46.06	24.37	3.94	1.43	.54	.18	3.58	80.11

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 4 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	2.87	2.87	.00	.00	.00	.00	.00	5.73	•	15.41	4.30	2.69	1.08	1.08	.00	1.25	25.81
5 TO 9	.00	1.43	.00	.00	.00	.00	.00	3.23	•	26.88	.54	.18	.54	.00	.00	.36	28.49
10- UP	.00	.00	.54	1.08	.18	.00	.00	1.79	•	.90	22.04	2.51	.00	.00	.00	.36	25.81
TOTAL	2.87	4.30	1.43	1.97	.18	.00	.00	10.75	•	43.19	26.88	5.38	1.61	1.08	.00	1.97	80.11

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 5 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	3.23	1.61	.00	.00	.00	.00	.00	4.84	•	15.41	5.91	1.79	.90	.72	.36	1.79	26.88
5 TO 9	.00	1.25	2.51	.72	.00	.00	.00	4.48	•	26.52	.90	.00	.00	.00	.00	.72	28.14
10- UP	.00	.00	1.08	1.08	.54	.00	.00	2.69	•	1.25	20.25	2.69	.18	.00	.00	.00	24.37
TOTAL	3.23	2.87	3.58	1.79	.54	.00	.00	12.01	•	43.19	27.06	4.48	1.08	.72	.36	2.51	79.39

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TABLE 1.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 6 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.69	1.97	.00	.00	.00	.00	.00	4.66 *	15.05	5.56	2.33	.72	.72	.00	2.51	26.88
5 TO 9	.00	2.15	.72	.72	.18	.00	.00	3.76 *	24.55	.36	.00	.36	.00	.00	.72	25.99
10- UP	.00	.00	1.25	1.43	.18	.00	.00	2.87 *	1.25	22.22	3.05	.00	.00	.00	.00	26.52
TOTAL	2.69	4.12	1.97	2.15	.36	.00	.00	11.29 *	40.86	28.14	5.38	1.08	.72	.00	3.23	79.39

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 7 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.97	3.94	.00	.00	.00	.00	.00	5.91 *	14.52	5.02	2.15	1.08	.72	.18	2.87	26.52
5 TO 9	.00	1.97	1.97	.18	.00	.00	.00	4.12 *	26.34	.36	.18	.00	.00	.00	.72	27.60
10- UP	.00	.00	1.61	1.08	.54	.00	.00	3.23 *	1.79	20.07	1.61	.00	.00	.00	.00	23.48
TOTAL	1.97	5.91	3.58	1.25	.54	.00	.00	13.26 *	42.65	25.45	3.94	1.08	.72	.18	3.58	77.60

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 8 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.33	3.41	.00	.00	.00	.00	.00	5.73 *	12.90	5.56	3.76	.72	.36	.36	2.69	26.34
5 TO 9	.00	1.25	.72	1.43	.00	.00	.00	3.41 *	25.45	.72	.36	.00	.00	.00	.54	27.06
10- UP	.00	.00	1.43	.18	.00	.00	.00	1.61 *	1.08	23.66	1.79	.18	.00	.00	.18	26.88
TOTAL	2.33	4.66	2.15	1.61	.00	.00	.00	10.75 *	39.43	29.93	5.91	.90	.36	.36	3.41	80.29

TABLE 1.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 9 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
[illegible]	1.61	2.87	.00	.00	.00	.00	.00	4.48	6.67	7.56	1.97	1.61	.72	.00	1.08	19.05
5 [illegible]	.00	2.15	3.23	1.43	.00	.00	.00	6.81	22.22	.18	1.25	.72	.00	.00	.36	24.73
[illegible]	.00	.00	1.97	1.79	.18	.00	.00	3.23	1.97	32.62	2.87	.00	.00	.00	.00	37.46
TOTAL	1.61	5.02	5.20	2.51	.18	.00	.00	14.52	30.87	36.38	5.56	2.33	.72	.00	1.43	77.24

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 10 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
[illegible]	.36	1.61	.00	.00	.00	.00	.00	1.97	2.87	2.33	2.33	1.79	.72	.18	.18	10.39
5 [illegible]	.00	2.51	3.58	2.51	.18	.00	.00	8.78	18.82	.90	.90	.90	.00	.00	.18	21.68
[illegible]	.00	.00	1.97	.90	.36	.00	.00	3.23	2.51	28.71	6.12	.18	.00	.00	.36	45.68
TOTAL	.36	4.12	5.56	3.41	.54	.00	.00	13.98	24.19	41.96	7.35	2.87	.72	.18	.72	77.96

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 11 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
[illegible]	.00	.54	.00	.00	.00	.00	.00	.54	1.97	1.61	2.33	51	1.08	.18	.00	9.06
6 [illegible]	.00	1.61	1.79	2.69	.36	.00	.00	6.45	15.59	.18		72	.00	.00	.36	19.10
[illegible]	.00	.00	2.87	1.43	.54	.18	.00	5.02	3.05	46.16	4	.00	.72	.00	.36	53.76
TOTAL	.00	2.15	4.66	4.12	.90	.18	.00	12.01	20.37	46.95	7	2.33		.18	.72	79.93

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TABLE 1.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 12 — NUMBER OBS. 558

TAIL-IND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.18	.36	.00	.00	.00	.00	.00	.54 *	.72	.90	1.08	1.25	1.43	.36	.00	5.73
5 TO 9	.00	1.08	1.61	2.15	.36	.00	.00	5.20 *	15.95	1.08	.36	.90	.00	.00	.36	18.64
10- UP	.00	.00	3.58	1.61	.90	.18	.00	6.27 *	3.94	46.77	4.84	.00	.00	.00	.00	55.56
TOTAL	.18	1.43	5.20	3.76	1.25	.18	.00	12.01 *	20.61	48.75	6.27	2.15	1.43	.36	.36	79.93

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 13 — NUMBER OBS. 558

TAIL-IND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	1.25	.00	.00	.00	.00	.00	1.25 *	.54	.72	1.61	1.25	.72	.00	.00	4.84
5 TO 9	.00	.54	1.79	2.15	.36	.00	.00	4.84 *	16.49	.54	.36	.54	.18	.00	.36	18.46
10- UP	.00	.00	2.33	1.97	.72	.18	.00	5.20 *	1.97	47.85	6.81	.18	.36	.18	.00	57.35
TOTAL	.00	1.79	4.12	4.12	1.08	.18	.00	11.29 *	19.00	49.10	8.78	1.97	1.25	.18	.36	80.65

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 14 — NUMBER OBS. 5[illegible]8

TAIL-IND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.36	.00	.00	.00	.00	.00	.36 *	1.25	.54	.54	1.25	.36	.36	.00	4.30
5 TO 9	.00	1.61	1.25	1.79	.36	.00	.00	5.02 *	16.49	2.15	.18	.72	.36	.00	.18	20.07
10- UP	.00	.00	2.87	1.79	.72	.18	.00	5.56 *	.79	48.21	6.81	.00	.00	.18	.00	56.99
TOTAL	.00	1.97	4.12	3.58	1.08	.18	.00	10.93 *	19.53	50.90	7.53	1.97	.72	.54	.18	81.36

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TABLE 1.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 15 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	.00	.72	.00	.00	.00	.00	.72	•	.72	.72	.72	.90	.54	.00	.00	3.58
5 TO 9	.00	1.79	.72	1.79	.18	.00	.00	4.48	• 19.89	2.15	.72	.54	.00	.00	.18	23.48
10- UP	.00	.00	2.15	1.79	.72	.00	.00	4.66	• .72	48.03	5.91	.18	.18	.00	.36	55.38
TOTAL	.00	2.51	2.87	3.58	.90	.00	.00	9.96	• 21.33	50.90	7.35	1.61	.72	.00	.54	82.44

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 16 — NUMBER OBS. 557

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	.00	.72	.00	.00	.00	.00	.00	.72	• 1.44	.54	.18	.72	.54	.00	.00	3.41
5 TO 9	.00	.36	1.62	1.08	.36	.00	.00	3.41	• 24.06	2.87	1.08	.36	.00	.00	.00	28.37
10- UP	.00	.00	3.41	1.08	.90	.36	.00	5.75	• .18	45.06	5.39	.00	.00	.00	.00	50.63
TOTAL	.00	1.08	5.03	2.15	1.26	.36	.00	9.87	• 25.67	48.47	6.64	1.08	.54	.00	.00	82.41

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 17 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	.36	.36	.00	.00	.00	.00	.00	.72	• 3.94	1.43	.90	.16	.00	.18	.18	6.81
5 TO 9	.00	1.08	1.61	.90	.18	.00	.00	3.76	• 29.75	3.76	.54	.54	.00	.00	.00	34.59
10- UP	.00	.00	1.97	1.61	.72	.00	.00	4.30	• .18	37.63	3.76	.18	.00	.00	.00	41.76
TOTAL	.36	1.43	3.58	2.51	.90	.00	.00	8.78	• 33.87	42.83	5.20	.90	.00	.18	.18	83.15

TABLE 1.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 18 — NUMBER OBS. 558

TAIL-IND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• • 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.69	1.43	.00	.00	.00	.00	.00	4.12 •	14.87	1.08	1.08	.72	.18	.00	1.08	19.00
5 TO 9	.00	1.79	1.43	1.61	.18	.00	.00	5.02 •	29.75	1.08	.36	.18	.00	.00	.36	31.72
10- UP	.00	.00	2.51	.54	.72	.00	.00	3.76 •	.18	24.73	3.23	.00	.00	.00	.00	28.14
TOTAL	2.69	3.23	3.94	2.15	.90	.00	.00	12.90 •	44.80	26.88	4.66	.90	.18	.00	1.43	78.85

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 19 — NUMBER OBS. 558

TAIL-IND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• • 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.58	1.79	.00	.00	.00	.00	.00	5.38 •	17.20	1.97	.72	.18	.18	.18	1.43	21.86
5 TO 9	.00	3.05	1.25	1.61	.00	.00	.00	5.91 •	29.57	1.08	.18	.00	.00	.00	.72	31.54
10- UP	.00	.00	1.43	.72	.36	.00	.00	2.51 •	.18	22.58	1.61	.00	.00	.00	.00	24.37
TOTAL	3.58	4.84	2.69	2.33	.36	.00	.00	13.80 •	46.95	25.63	2.51	.18	.18	.18	2.15	77.78

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JAN.

HOUR 20 — NUMBER OBS. 558

TAIL-IND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• • 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.58	1.08	.00	.00	.00	.00	.00	4.66 •	17.38	1.79	1.08	.36	.00	.18	1.43	22.22
5 TO 9	.00	3.23	1.25	1.08	.00	.00	.00	5.56 •	26.16	1.25	.18	.00	.00	.00	1.08	29.67
10- UP	.00	.00	1.08	.72	.36	.00	.00	2.15 •	.18	26.34	1.43	.00	.18	.00	.18	28.32
TOTAL	3.58	4.30	2.33	1.79	.36	.00	.00	12.37 •	43.73	29.39	2.69	.36	.18	.18	2.69	79.21

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TABLE 1.3. (Concluded)

RSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF JAN.

HOUR 21 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS						ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP			1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
	PERCENTAGES								PERCENTAGES							
1 TO 4	0.12	2.69	.00	.00	.00	.00	.00	6.81	16.31	1.61	.72	.72	.18	.18	2.33	22.04
5 TO 9	.00	3.05	.72	1.79	.00	.00	.00	5.56	26.34	.90	.36	.18	.00	.00	.72	29.49
10- UP	.00	.00	.72	.90	.36	.00	.00	1.97	.72	24.91	1.25	.00	.00	.00	.00	26.88
TOTAL	0.12	5.73	1.43	2.69	.36	.00	.00	14.34	43.37	27.42	2.33	.90	.18	.18	3.05	77.42

RSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF JAN.

HOUR 22 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS						ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP			1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.23	2.15	.00	.00	.00	.00	.00	5.38	17.20	2.51	.18	.18	.54	.18	1.25	22.04
5 TO 9	.00	2.15	1.08	1.08	.18	.00	.00	4.48	26.88	.72	.36	.18	.00	.00	1.25	29.39
10- UP	.00	.00	1.25	.72	.00	.00	.00	1.97	.54	25.99	1.43	.00	.00	.00	.00	27.96
TOTAL	3.23	4.30	2.33	1.79	.18	.00	.00	11.83	44.62	29.21	1.97	.36	.54	.18	2.51	79.39

RSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF JAN.

HOUR 23 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS						ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP			1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.23	2.51	.00	.00	.00	.00	.00	5.73	14.52	2.33	.54	.72	.72	.00	2.87	21.68
5 TO 9	.00	2.15	.36	1.08	.00	.00	.00	3.58	26.70	.72	.36	.00	.00	.00	1.61	29.39
10- UP	.00	.00	1.08	.90	.00	.00	.00	1.97	1.07	25.27	1.97	.00	.00	.00	.54	29.21
TOTAL	3.23	4.66	1.43	1.97	.00	.00	.00	11.29	42.65	28.32	2.87	.72	.72	.00	5.02	80.29

TABLE 1.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS HEAD/TAIL WIND REVERSALS
MONTH OF JAN.

HRS	*** RUNWAY 15 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD	*** RUNWAY 33 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD
00-02	8.62	4.55	4.07	5.05	40.72	9.99	4.67	5.33	25.57	6.52
03-05	9.34	4.79	4.55	5.30	41.08	10.77	5.27	5.51	26.19	6.89
06-08	10.71	5.86	4.85	6.64	41.54	12.99	6.16	6.82	29.60	8.62
09-11	11.97	5.57	6.40	6.42	47.98	12.03	6.46	5.57	30.08	7.09
12-14	9.04	4.19	4.85	4.72	42.86	9.16	4.97	4.19	25.78	5.19
15-17	7.96	4.49	3.47	4.96	36.71	8.38	3.59	4.79	20.76	5.79
18-20	9.58	5.07	4.55	5.78	34.86	10.05	4.79	5.27	22.35	6.70
21-23	8.80	3.53	5.27	4.04	42.11	10.47	6.04	4.43	28.77	5.61
00-23	9.50	4.75	4.75	5.37	41.13	10.48	5.24	5.24	26.27	6.54

1.4A

KSC PEAK WINDS HEADWIND TO TAILWIND REVERSALS
MONTH OF JAN.

HRS	*** RUNWAY 15 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL	*** RUNWAY 33 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL
00-02	2.13	1.86	1.06	5.05	13.77	5.57	6.23	25.57
03-05	2.42	1.82	1.14	5.38	15.48	3.87	6.85	26.19
06-08	2.10	3.39	1.15	6.64	14.66	6.61	8.33	29.60
09-11	.35	3.25	2.83	6.42	6.69	5.01	18.38	30.08
12-14	.27	1.82	2.63	4.72	5.59	1.29	18.99	25.78
15-17	.79	2.05	2.12	4.96	5.88	1.04	13.84	20.76
18-20	1.93	2.62	1.24	5.78	9.50	5.59	7.26	22.35
21-23	1.85	1.50	.68	4.04	15.38	6.84	6.55	28.77
00-23	1.48	2.28	1.61	5.37	10.98	4.57	10.76	26.27

1.4B

TABLE 1.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF JAN.

RUNWAY COMPONENT CLASS (KNOTS)	*** RUNWAY 15 *** HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	*	*** RUNWAY 33 *** HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF
0- 1	17.06	12.15	9.68	9.05	11.96	*	44.00	37.57	41.05	45.17	41.78
1- 2	23.56	16.64	12.54	10.77	15.84	*	46.86	38.12	41.05	45.17	42.66
2- 3	27.56	18.23	13.42	11.23	17.56	*	55.14	40.33	41.98	46.21	45.93
3- 4	34.53	19.96	13.69	12.75	20.18	*	61.71	42.54	42.90	47.59	48.79
4- 5	40.49	22.31	14.57	13.74	22.71	*	69.71	48.34	44.75	49.31	53.32
5- 6	47.19	25.90	15.71	17.31	26.46	*	74.86	58.56	49.69	54.83	59.88
6- 7	52.74	29.35	17.53	21.14	30.12	*	77.43	63.26	53.09	57.93	63.3[illegible]
7- 8	57.75	33.22	20.09	27.54	34.60	*	82.29	68.51	58.33	62.07	68.25
8- 9	62.76	37.91	24.48	33.36	39.58	*	85.14	74.86	63.27	65.17	72.62
9-10	70.95	47.17	36.08	45.57	49.92	*	87.71	82.32	70.68	71.72	78.58
10-11	74.75	54.28	43.36	52.18	56.11	*	90.29	85.08	75.00	76.21	82.05
11-12	77.79	59.32	49.29	57.79	61.03	*	92.00	87.57	79.32	79.31	84.92
12-13	81.52	65.54	56.24	66.51	67.44	*	92.86	91.16	85.19	85.52	88.91
13-14	83.21	70.10	61.56	71.53	71.60	*	93.14	91.99	87.35	87.59	90.20
14-15	85.44	74.52	67.84	75.43	75.80	*	95.43	94.75	90.43	90.00	92.84
15-16	87.81	78.66	73.30	79.13	79.72	*	96.57	96.41	9[illegible] 90	92.41	94.72
16-17	89.30	83.15	77.68	82.89	83.25	*	98.29	97.79	95.68	96.21	97.06
17-18	91.20	85.84	81.66	85.07	85.93	*	98.29	97.79	99.46	96.90	97.89
18-19	94.18	89.99	86.31	89.56	90.00	*	99.14	99.45	99.38	97.24	98.87
19-20	96.28	93.51	91.98	93.73	93.87	*	99.71	100.00	99.69	98.62	99.55
20-21	97.36	95.37	93.73	94.98	95.36	*	100.00	******	100.00	99.31	99.85
21-22	98.24	96.96	95.35	96.30	96.71	*	******	******	******	99.31	99.85
22-23	98.51	97.65	96.43	96.96	97.38	*	******	******	******	99.66	99.92
23-24	98.85	98.41	97.64	97.89	98.19	*	******	******	******	99.66	99.92
24-25	99.26	98.83	98.38	98.41	98.72	*	******	******	******	100.00	100.00
25-26	99.39	99.24	98.72	99.01	99.09	*	******	******	******	******	******
26-27	99.66	99.45	99.19	99.21	99.38	*	******	******	******	******	******
27-28	99.66	99.65	99.39	99.54	99.56	*	******	******	******	******	******
28-29	99.73	99.86	99.53	99.60	99.68	*	******	******	******	******	******
29-30	99.80	100.00	99.73	99.93	99.86	*	******	******	******	******	******
30-31	99.86	******	99.87	99.93	99.92	*	******	******	******	******	******
31-32	99.93	******	100.00	99.93	99.97	*	******	******	******	******	******
32-33	100.00	******	******	100.00	100.00	*	******	******	******	******	******
NOBS	1477	1448	1483	1514	5922	*	350	362	324	290	1326

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TABLE 2.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF FEB.

RUNWAY 15 - 33

HRS	CROSSWIND ***** CRITICAL LIMITS IN KNOTS ***** 1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	47.22	31.43	6.48	1.96	.65	.20	12.05	1527
03-05	45.58	32.68	6.89	2.29	.79	.07	11.72	1527
06-08	43.29	33.27	7.86	2.16	1.38	.20	11.65	1527
09-11	24.17	46.76	11.98	5.30	1.90	.65	9.23	1527
12-14	15.13	54.55	14.47	4.39	2.10	.79	8.58	1527
15-17	22.07	49.77	12.84	4.39	1.77	.52	8.64	1527
18-20	41.91	35.23	7.53	3.27	.98	.07	11.00	1527
21-23	44.89	33.94	6.68	1.77	.52	.00	12.19	1526
00-23	35.53	39.71	9.34	3.19	1.26	.31	10.66	12215

TABLE 2.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF FEB.

HRS	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	3.80	3.34	1.11	1527	19.78	32.48	29.99
03-05	4.32	3.01	1.57	1527	24.36	28.95	28.09
06-08	5.04	3.86	1.70	1527	24.43	26.06	29.47
09-11	1.77	5.30	3.67	1527	9.30	20.43	51.02
12-14	.13	3.73	3.86	1527	3.27	15.19	65.62
15-17	.13	2.62	4.52	1527	2.29	23.71	58.48
18-20	2.10	3.93	2.62	1527	16.83	29.67	35.49
21-23	3.34	2.69	1.38	1526	20.05	28.37	34.27
00-23	2.58	3.56	2.55	12215	15.04	25.61	41.56

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TABLE 2.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 0 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES							
1 TO 4	1.77	1.38	.00	.00	.00	.00	.00	3.14	*	13.36	2.95	1.18	.20	.20	.00	1.38	19.25
5 TO 9	.00	1.96	.59	.59	.00	.00	.00	3.14	*	31.63	.59	.00	.39	.00	.00	.98	33.60
10- UP	.00	.00	.20	.39	.20	.00	.00	.79	*	1.57	24.75	3.93	.20	.00	.20	.00	30.65
TOTAL	1.77	3.34	.79	.98	.20	.00	.00	7.07	*	46.56	28.29	5.11	.79	.20	.20	2.36	83.50

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 1 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES							
1 TO 4	2.16	1.77	.00	.00	.00	.00	.00	3.93	*	14.73	1.96	1.18	.98	.59	.00	.39	19.84
5 TO 9	.00	1.96	1.57	.20	.00	.00	.00	3.73	*	29.47	.79	.39	.39	.00	.00	1.38	32.42
10- UP	.00	.00	.39	.59	.39	.00	.00	1.38	*	.98	24.17	3.54	.20	.00	.00	.20	29.08
TOTAL	2.16	3.73	1.96	.79	.39	.00	.00	9.04	*	45.19	26.92	5.11	1.57	.59	.00	1.96	81.34

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 2 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES							
1 TO 4	2.95	1.38	.00	.00	.00	.00	.00	4.32	*	13.95	2.95	.59	.59	.59	.20	1.38	20.24
5 TO 9	.00	1.77	.59	.79	.00	.00	.00	3.14	*	28.88	.00	.79	.00	.00	.00	1.77	31.43
10- UP	.00	.00	.59	.39	.00	.20	.00	1.18	*	.20	25.93	3.93	.00	.00	.00	.20	30.26
TOTAL	2.95	3.14	1.18	1.18	.00	.20	.00	8.64	*	43.03	28.88	5.30	.59	.59	.20	3.34	81.93

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TABLE 2.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 3 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.34	1.96	.00	.00	.00	.00	.00	5.30 *	14.93	4.32	.59	.79	.59	.00	.59	21.81
5 TO 9	.00	1.38	.98	.79	.20	.00	.00	3.34 *	27.90	.59	.20	.00	.00	.00	.98	29.67
10- UP	.00	.00	.59	.00	.20	.00	.00	.79 *	.98	24.36	3.73	.20	.00	.00	.00	29.27
TOTAL	3.34	3.34	1.57	.79	.39	.00	.00	9.43 *	43.81	29.27	4.52	.98	.59	.00	1.57	80.75

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 4 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.96	2.16	.00	.00	.00	.00	.00	4.13 *	16.11	4.52	.98	1.38	.39	.00	1.18	24.56
5 TO 9	.00	1.57	.98	.20	.00	.00	.00	2.75 *	27.90	1.38	.79	.00	.00	.00	.79	30.84
10- UP	.00	.00	.98	.39	.20	.00	.00	1.57 *	.39	22.00	4.13	.39	.00	.00	.00	26.92
TOTAL	1.96	3.73	1.96	.59	.20	.00	.00	8.45 *	44.40	27.90	5.89	1.77	.39	.00	1.96	82.32

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 5 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.38	2.16	.00	.00	.00	.00	.00	3.54 *	17.29	5.11	1.57	.79	.39	.00	1.57	26.72
5 TO 9	.00	1.38	.98	.59	.00	.00	.00	2.95 *	23.77	1.18	.20	.39	.00	.00	.79	26.33
10- UP	.00	.00	1.18	.59	.39	.20	.00	2.36 *	.79	23.97	2.75	.39	.00	.00	.20	28.09
TOTAL	1.38	3.54	2.16	1.18	.39	.20	.00	8.84 *	41.85	30.26	4.52	1.57	.39	.00	2.55	81.14

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TABLE 2.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 6 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	1.96	2.55	.07	.00	.00	.00	.00	4.52 •	17.49	3.73	1.18	1.57	.79	.20	.79	25.74
5 TO 9	.00	.79	1.33	.59	.20	.00	.00	3.34 •	25.15	.98	.59	.20	.00	.00	.59	27.50
10- UP	.00	.00	1.38	.20	.07	.00	.00	1.57 •	1.38	22.59	2.95	.00	.20	.00	.20	27.31
TOTAL	1.96	3.34	3.14	.79	.20	.00	.00	9.43 •	44.01	27.31	4.72	1.77	.98	.20	1.57	80.55

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 7 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	3.14	1.57	.00	.00	.00	.00	.20	4.91 •	15.17	5.70	1.96	1.18	.39	.00	1.77	26.13
5 TO 9	.00	1.38	.98	.98	.00	.00	.00	3.34 •	25.34	.79	.39	.00	.00	.00	1.18	27.70
10- UP	.00	.00	1.18	.39	.20	.00	.00	1.77 •	1.18	23.18	2.16	.20	.20	.00	.00	26.92
TOTAL	3.14	2.95	2.16	1.38	.20	.00	.20	10.02 •	41.65	29.67	4.52	1.38	.59	.00	2.95	80.75

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 8 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	3.73	1.96	.00	.00	.00	.00	.00	5.70 •	13.56	3.14	1.38	.20	1.57	.20	1.38	21.41
5 TO 9	.00	1.18	2.95	.59	.20	.00	.00	4.91 •	20.69	.98	.39	.00	.00	.00	.98	22.99
10- UP	.00	.00	.79	.39	.39	.20	.00	1.77 •	1.18	29.27	3.54	.00	.00	.00	.20	34.18
TOTAL	3.73	3.14	3.73	.98	.59	.20	.00	12.38 •	35.36	33.40	5.30	.20	1.57	.20	2.55	78.59

TABLE 2.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 9 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.98	1.38	.00	.00	.00	.00	.00	2.36 *	5.50	2.95	.98	1.38	.98	.20	.20	12.18
5 TO 9	.09	2.75	1.96	1.18	.20	.00	.00	6.09 *	21.61	.98	.20	.00	.00	.00	.39	23.18
10- UP	.00	.00	1.77	.79	.20	.20	.00	2.95 *	2.16	37.13	4.32	.59	.20	.00	.20	44.60
TOTAL	.98	4.13	3.73	1.96	.39	.20	.00	11.39 *	29.27	41.06	5.50	1.96	1.18	.20	.79	79.96

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 10 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.39	1.57	.00	.00	.00	.00	.00	1.96 *	1.57	2.36	1.38	1.96	1.18	.79	.00	9.23
5 TO 9	.00	1.77	1.67	1.96	.00	.00	.00	5.38 *	16.59	.59	.98	.00	.00	.00	.20	18.27
10- UP	.00	.00	1.96	1.38	.39	.20	.00	3.93 *	3.14	41.45	6.48	.98	.20	.00	.20	52.46
TOTAL	.39	3.34	3.54	3.34	.39	.20	.00	11.20 *	21.22	44.40	8.84	2.95	1.38	.79	.39	79.96

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 11 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.39	.59	.00	.00	.00	.00	.00	.98 *	.79	1.57	1.38	1.38	.79	.39	.20	6.48
5 TO 9	.00	.98	1.77	1.57	.20	.00	.00	4.52 *	15.91	.39	2.16	.59	.00	.00	.79	19.84
10- UP	.00	.00	1.77	1.18	.98	.20	.00	4.13 *	3.54	43.81	7.27	.98	.39	.00	.00	55.99
TOTAL	.39	1.57	3.54	2.75	1.18	.20	.00	9.63 *	20.24	45.78	10.81	2.95	1.18	.39	.98	82.32

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TABLE 2.3. (Continued)

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 12 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00 •	.00	.79	.79	1.18	.39	.59	.00	3.73
5 TO 9	.00	1.57	1.77	1.77	.00	.00	.00	5.31 •	13.16	.79	.39	.79	.00	.00	.20	15.32
10- 3	.00	.00	1.77	.39	.98	.39	.00	3.54 •	2.16	50.69	9.63	1.18	.00	.00	.39	64.05
TOTAL	.00	1.57	3.54	2.16	.98	.39	.00	8.64 •	15.32	52.26	10.81	3.14	.39	.59	.59	83.10

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 13 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	.00	.20	.00	.00	.00	.00	.00	.20 •	.00	.79	.39	.79	.98	.00	.00	2.95
5 TO 9	.00	.79	1.57	.98	.20	.00	.00	3.54 •	13.56	1.18	.20	.59	.00	.00	.00	15.52
10- 4	.00	.00	.98	.98	1.38	.20	.00	3.54 •	1.77	52.06	11.00	.79	.20	.39	.00	66.21
TOTAL	.00	.98	2.55	1.96	1.57	.20	.00	7.27 •	15.32	54.03	11.59	2.16	1.18	.39	.00	84.68

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 14 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	.00	.20	.00	.00	.00	.00	.00	.20 •	.59	.20	.20	1.18	.39	.39	.20	3.14
5 TO 9	.00	1.38	.39	.59	.20	.00	.00	2.55 •	13.16	.59	.59	.20	.00	.00	.20	14.73
10- 4	.00	.00	1.77	1.18	1.38	.20	.00	4.52 •	.98	52.46	11.98	.59	.20	.20	.20	66.60
TOTAL	.00	1.57	2.16	1.77	1.57	.20	.00	7.27 •	14.73	53.24	12.77	1.96	.59	.59	.59	84.48

TABLE 2.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 15 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.20	.00	.00	.00	.00	.00	.20	.39	.39	.20	.39	.39	.00	.00	1.77
5 TO 9	.00	.79	.59	.98	.39	.00	.00	2.75	16.50	1.38	.20	1.18	.00	.00	.20	19.45
10- UP	.00	.00	1.38	2.36	2.16	.00	.00	5.89	.20	47.15	12.57	1.38	.00	.20	.20	61.69
TOTAL	.00	.98	1.96	3.34	2.55	.00	.00	8.84	17.09	48.92	12.97	2.95	.39	.20	.39	82.91

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 16 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.20	.00	.00	.00	.00	.00	.20	.79	.39	.20	.39	.39	.00	.20	2.36
5 TO 9	.00	.79	.59	.98	.00	.00	.00	2.36	19.45	.98	.79	.20	.00	.00	.39	21.81
10- UP	.00	.00	1.18	1.38	1.18	.00	.00	3.73	.39	49.51	10.41	.39	.20	.39	.00	61.50
TOTAL	.00	.98	1.77	2.36	1.18	.00	.00	6.29	20.63	50.88	11.39	.98	.59	.39	.59	85.46

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 17 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	1.18	.20	.39	.39	.20	.39	.00	2.75
5 TO 9	.00	.98	.39	1.18	.20	.00	.00	2.75	27.11	1.77	.39	.39	.00	.00	.20	29.86
10- UP	.00	.00	2.16	1.18	.20	.39	.00	3.93	.20	44.60	7.07	.39	.00	.20	.00	52.46
TOTAL	.00	.98	2.55	2.36	.39	.39	.00	6.68	28.49	46.56	7.86	1.18	.20	.59	.20	85.07

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TABLE 2.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 18 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.59	.79	.00	.00	.00	.00	.00	1.38	8.64	.39	.39	.39	.39	.00	.59	10.81
5 TO 9	.00	1.57	.79	.98	.60	.00	.00	3.34	30.26	1.57	.00	.00	.00	.00	.39	32.22
10- UP	.00	.00	1.96	1.57	.79	.00	.00	4.32	.39	33.20	4.91	.59	.00	.00	.00	39.10
TOTAL	.59	2.36	2.75	2.55	.79	.00	.00	9.04	39.29	35.17	5.30	.98	.39	.00	.98	82.12

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 19 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.98	.79	.00	.00	.00	.00	.00	1.77	14.54	1.57	.59	.98	.59	.00	1.18	19.45
5 TO 9	.00	2.36	.79	1.38	.00	.00	.00	4.52	26.92	.79	.00	.59	.00	.00	.39	28.68
10- UP	.00	.00	1.38	.39	.20	.00	.00	1.96	.59	29.47	3.73	.39	.00	.00	.00	34.18
TOTAL	.98	3.14	2.16	1.77	.20	.00	.00	8.25	42.04	31.83	4.32	1.96	.59	.00	1.57	82.32

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 20 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.18	1.95	.00	.00	.00	.00	.00	3.14	14.34	1.96	.59	.98	.98	.00	1.38	20.24
5 TO 9	.00	1.96	.59	1.38	.00	.00	.00	3.93	26.33	.59	.20	.00	.00	.00	.98	28.09
10- UP	.00	.00	1.38	.20	.00	.00	.00	1.57	.98	26.72	5.30	.00	.00	.20	.00	33.20
TOTAL	1.18	3.93	1.96	1.57	.00	.00	.00	8.64	41.65	29.27	6.09	.98	.98	.20	2.36	81.53

TABLE 2.3. (Concluded)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 21 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES															
1 TO 4	1.96	.98	.00	.00	.00	.00	.00	2.95	* 15.91	1.38	1.18	.79	.39	.00	1.38	21.02
5 TO 9	.00	1.57	1.18	.20	.00	.00	.00	2.95	* 24.36	.20	.00	.00	.00	.00	1.38	25.93
10- UP	.00	.00	1.38	.79	.00	.00	.00	2.16	* .79	29.86	3.93	.20	.00	.00	.20	34.97
TOTAL	1.96	2.55	2.55	.98	.00	.00	.00	8.06	* 41.06	31.43	5.11	.98	.39	.00	2.95	81.93

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 22 — NUMBER OBS. 508

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES															
1 TO 4	2.36	1.18	.00	.00	.00	.00	.00	3.54	* 13.78	2.36	1.38	.98	.20	.00	1.18	19.88
5 TO 9	.00	1.57	.59	.59	.00	.00	.00	2.76	* 25.98	1.18	.00	.00	.00	.00	.98	28.15
10- UP	.00	.00	.59	.20	.00	.00	.00	.79	* 1.57	29.72	3.15	.20	.20	.00	.00	34.84
TOTAL	2.36	2.76	1.18	.79	.00	.00	.00	7.09	* 41.34	33.27	4.53	1.18	.39	.00	2.17	82.87

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF FEB.

HOUR 23 — NUMBER OBS. 509

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES															
1 TO 4	1.96	1.57	.00	.00	.00	.00	.00	3.54	* 13.95	2.75	.79	.00	.59	.00	1.18	19.25
5 TO 9	.00	.79	.98	.39	.20	.00	.00	2.36	* 29.27	.59	.39	.20	.00	.00	.59	31.04
10- UP	.00	.00	.79	.39	.00	.00	.00	1.18	* 2.75	26.13	3.73	.39	.00	.00	.00	33.01
TOTAL	1.96	2.36	1.77	.79	.20	.00	.00	7.07	* 45.97	29.47	4.91	.59	.59	.00	1.77	83.30

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TABLE 2.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — HEAD/TAIL WIND REVERSALS
MONTH OF FEB.

HRS	*** RUNWAY 15 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD	*** RUNWAY 33 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD
00-02	7.35	4.07	3.28	4.43	39.68	9.40	3.74	4.66	21.03	5.67
03-05	8.99	4.44	4.53	4.90	51.11	10.10	5.05	5.05	27.71	6.20
06-08	11.35	6.04	5.31	6.75	50.31	12.20	5.97	6.23	29.84	7.79
09-11	11.29	5.18	6.10	5.80	57.06	11.91	6.43	5.38	33.05	6.66
12-14	8.07	4.07	4.00	4.41	51.69	8.33	4.13	4.20	25.93	5.00
15-17	6.10	3.08	3.02	3.33	41.44	6.30	3.02	3.28	19.41	3.89
18-20	7.68	3.67	4.00	4.02	46.21	8.46	4.40	4.46	24.36	5.44
21-23	7.09	3.35	3.74	3.61	50.99	9.46	4.72	4.13	27.27	5.00
00-23	8.49	4.24	4.25	4.64	48.91	9.36	4.68	4.68	26.30	5.69

24A

KSC PEAK WINDS — HEADWIND TO TAILWIND REVERSALS
MONTH OF FEB.

HRS	*** RUNWAY 15 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL	*** RUNWAY 33 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL
00-02	1.65	2.36	.43	4.43	7.38	5.90	7.75	21.03
03-05	1.80	2.23	.86	4.90	14.49	6.36	6.36	27.21
06-08	2.36	3.23	1.17	6.75	15.00	6.84	7.97	29.84
09-11	.51	2.57	2.72	5.80	9.90	5.12	18.43	33.45
12-14	.00	1.42	2.99	4.41	4.53	1.23	20.16	25.93
15-17	.07	1.20	2.05	3.33	2.95	1.69	14.77	19.41
18-20	.79	1.72	1.51	4.02	8.00	6.18	10.18	24.36
21-23	1.56	1.63	.43	3.61	14.39	7.20	5.68	27.27
00-23	1.09	2.04	1.52	4.64	9.86	5.20	11.24	26.30

24B

TABLE 2.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

HSC PEAK WINDS — HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF FEB.

RUNWAY COMPONENT CLASS	HOURS 06-09 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	*	HOURS 06-09 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF
	••• RUNWAY 15 •••						••• RUNWAY 33 •••				
0- 1	16.12	11.74	9.16	9.25	11.53	*	47.19	44.22	51.44	53.16	48.70
1- 2	20.81	15.70	11.14	10.31	14.42	*	52.29	44.56	51.44	53.16	50.19
2- 3	23.94	17.39	11.85	10.59	15.87	*	62.75	46.69	51.44	53.16	53.70
3- 4	31.94	19.09	11.92	10.81	18.31	*	67.69	50.09	51.85	53.16	56.11
4- 5	37.88	19.96	12.42	11.37	20.26	*	72.22	53.40	52.26	54.01	58.61
5- 6	46.15	23.33	14.05	14.12	24.24	*	79.74	61.56	57.20	56.54	64.63
6- 7	51.36	27.07	15.05	16.31	27.25	*	83.99	64.63	61.32	57.38	67.78
7- 8	56.04	31.11	17.39	20.38	31.01	*	85.62	69.05	64.61	60.34	70.83
8- 9	58.90	35.07	20.72	24.79	34.67	*	90.52	73.47	71.19	65.82	76.11
9-10	67.03	42.84	28.89	36.99	43.79	*	91.50	80.95	75.72	70.89	80.56
10-11	71.36	48.13	34.67	43.01	49.11	*	93.14	85.37	80.25	74.26	83.98
11-12	75.46	53.04	40.24	48.23	54.08	*	94.44	87.07	83.13	77.22	86.11
12-13	79.71	58.84	48.97	57.06	61.01	*	95.75	89.80	85.19	81.01	88.52
13-14	81.76	63.02	54.36	61.30	64.99	*	97.06	91.50	87.24	82.28	90.39
14-15	84.91	68.16	61.39	65.68	69.93	*	98.04	92.86	92.18	85.65	92.59
15-16	87.18	73.07	66.93	69.14	73.98	*	98.04	94.56	93.83	87.34	93.80
16-17	89.16	77.40	71.66	73.94	77.96	*	99.35	96.94	95.47	91.98	96.20
17-18	91.06	80.56	75.80	77.40	81.13	*	99.67	98.30	96.30	93.67	97.22
18-19	92.67	85.55	80.20	81.85	85.00	*	99.67	98.64	96.30	94.51	97.50
19-20	95.68	90.46	85.73	87.64	89.83	*	100.00	99.32	97.53	96.20	98.43
20-21	96.19	92.30	88.15	90.18	91.66	*	******	99.66	98.77	96.20	98.80
21-22	97.36	94.42	91.13	92.66	93.86	*	******	99.66	99.18	98.73	99.44
22-23	97.80	95.23	92.62	94.28	94.96	*	******	99.66	99.18	99.16	99.54
23-24	98.24	96.18	94.32	95.69	96.09	*	******	99.66	99.18	99.16	99.54
24-25	98.53	96.48	95.60	96.82	96.85	*	******	99.66	99.59	100.00	99.81
25-26	98.90	97.29	96.81	97.67	97.66	*	******	99.66	99.59	******	99.81
26-27	99.12	97.87	97.23	98.02	98.06	*	******	99.66	100.00	******	99.91
27-28	99.34	98.24	97.87	98.59	98.51	*	******	100.00	******	******	100.00
28-29	99.49	98.39	98.37	98.80	98.76	*	******	******	******	******	******
29-30	99.71	98.83	98.86	99.15	99.16	*	******	******	******	******	******
30-31	99.93	99.05	99.08	99.36	99.35	*	******	******	******	******	******
31-32	99.93	99.12	99.22	99.44	99.42	*	******	******	******	******	******
32-33	99.93	99.27	99.36	99.58	99.53	*	******	******	******	******	******
33-34	100.00	99.34	99.50	99.64	99.68	*	******	******	******	******	******
34-35	******	99.49	99.50	99.86	99.71	*	******	******	******	******	******
35-36	******	99.63	99.57	100.00	99.80	*	******	******	******	******	******
36-37	******	99.93	99.72	******	99.91	*	******	******	******	******	******
37-38	******	99.93	99.79	******	99.93	*	******	******	******	******	******
38-39	******	99.93	100.00	******	99.98	*	******	******	******	******	******
39-40	******	99.93	******	******	99.98	*	******	******	******	******	******
40-41	******	99.93	******	******	99.98	*	******	******	******	******	******
41-42	******	99.93	******	******	99.98	*	******	******	******	******	******
42-43	******	99.93	******	******	99.98	*	******	******	******	******	******
43-44	******	100.00	******	******	100.00	*	******	******	******	******	******
44+5	1365	1363	1409	1416	5553	*	306	298	293	237	1080

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TABLE 3.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF MARCH

RUNWAY 15 - 33

HRS	CROSSWIND ***** CRITICAL LIMITS IN KNOTS ***** 1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	50.73	35.99	8.88	2.02	.38	.25	4.74	1581
03-05	54.08	29.92	7.27	2.53	.51	.13	5.57	1581
06-08	45.41	37.44	8.22	2.91	1.14	.06	4.81	1581
09-11	18.60	59.77	13.35	5.57	1.08	.32	1.33	1581
12-14	10.69	66.03	16.82	4.05	1.14	.76	.51	1581
15-17	13.92	63.88	16.09	2.53	1.01	.25	.32	1581
18-20	39.60	49.27	8.22	.89	.32	.00	1.71	1581
21-23	47.09	42.59	5.19	.89	.51	.25	3.48	1581
00-23	35.01	48.11	10.38	2.67	.76	.25	2.81	12647

TABLE 3.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF MARCH

HRS	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	1.83	1.90	.70	1581	19.67	37.44	36.69
03-05	1.96	2.34	.89	1581	24.41	38.52	29.92
06-08	3.35	2.47	1.52	1581	22.83	31.37	36.81
09-11	1.01	4.05	3.35	1581	3.86	17.71	69.39
12-14	.06	1.52	2.91	1581	1.14	11.26	82.73
15-17	.00	1.01	2.15	1581	1.90	15.37	79.38
18-20	1.39	1.90	.95	1581	10.50	34.16	50.73
21-23	3.35	1.58	.76	1580	15.95	34.37	42.91
00-23	1.62	2.10	1.65	12647	12.53	27.52	53.57

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TABLE 3.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 0 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES						
1 TO 4	.38	1.14	.00	.00	.00	.00	.00	1.52	*	14.80	1.52	.19	.57	.57	.38	1.52	19.54
5 TO 9	.00	.57	.57	.19	.19	.00	.00	1.52	*	31.88	.95	.95	.38	.00	.00	.95	35.10
10- UP	.00	.00	.19	.00	.00	.00	.00	.19	*	2.66	34.35	3.80	.00	.00	.00	.19	40.99
TOTAL	.38	1.71	.76	.19	.19	.00	.00	3.23	*	49.34	36.81	4.93	.95	.57	.38	2.66	95.64

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 1 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES						
1 TO 4	1.33	.57	.00	.00	.00	.00	.00	1.90	*	14.23	2.28	1.14	1.14	.00	.00	1.90	20.68
5 TO 9	.00	.95	.57	.19	.00	.00	.00	1.71	*	32.64	1.71	.95	.19	.00	.00	1.14	36.62
10- UP	.00	.00	.38	.38	.19	.19	.00	1.14	*	2.09	29.98	3.61	.19	.00	.19	.19	36.24
TOTAL	1.33	1.52	.95	.57	.19	.19	.00	4.74	*	48.96	33.97	5.69	1.52	.00	.19	3.23	93.55

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 2 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES						
1 TO 4	.76	1.33	.00	.00	.00	.00	.00	2.09	*	13.28	1.90	.76	.95	.19	.00	1.71	18.79
5 TO 9	.00	1.14	.19	1.14	.00	.00	.00	2.47	*	36.43	1.90	.57	.38	.00	.00	1.33	40.61
10- UP	.00	.00	.38	.38	.00	.00	.00	.76	*	1.71	27.70	3.42	.00	.00	.00	.00	32.83
TOTAL	.76	2.47	.57	1.52	.00	.00	.00	5.31	*	51.42	31.50	4.74	1.33	.19	.00	3.04	92.22

TABLE 3.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 3 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.33	.38	.00	.00	.00	.00	.00	1.71	14.80	3.23	1.14	.57	.57	.19	1.90	22.39
5 TO 9	.00	.76	.76	.76	.00	.00	.00	2.28	35.10	1.52	.76	.38	.00	.00	2.09	39.85
10- UP	.38	.00	.19	.38	.57	.00	.00	1.14	.57	23.91	4.93	.38	.00	.00	.19	29.98
TOTAL	1.33	1.14	.95	1.14	.57	.00	.00	5.12	50.47	28.65	6.83	1.33	.57	.19	4.17	92.22

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 4 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.52	.76	.00	.00	.00	.00	.00	2.28	16.89	3.04	1.52	.95	.00	.19	2.28	24.86
5 TO 9	.00	1.90	.57	.57	.00	.00	.00	3.04	34.35	1.52	.57	.38	.00	.00	.76	37.57
10- UP	.00	.00	.19	.57	.00	.00	.00	.76	2.09	22.77	4.36	.19	.19	.00	.19	29.79
TOTAL	1.52	2.66	.76	1.14	.00	.00	.00	6.07	53.32	27.32	6.45	1.52	.19	.19	3.23	92.22

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 5 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.95	.95	.00	.00	.00	.00	.00	1.90	18.41	3.04	1.71	1.52	.19	.00	1.14	26.00
5 TO 9	.00	.95	.38	.38	.00	.00	.00	1.71	34.16	1.52	.00	.19	.00	.00	2.28	38.14
10- UP	.38	.00	.57	.19	.00	.00	.00	.76	2.09	23.53	4.17	.19	.00	.00	.00	29.98
TOTAL	.95	1.90	.95	.57	.00	.00	.00	4.36	54.65	28.08	5.88	1.90	.19	.00	3.42	94.12

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TABLE 3.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 6 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.28	1.33	.00	.00	.00	.00	.19	3.80 *	18.60	5.31	1.33	.95	.38	.00	1.14	27.70
5 TO 9	.00	.76	.38	1.14	.00	.00	.00	2.28 *	28.84	1.52	.19	.19	.00	.00	2.47	33.21
10- UP	.00	.00	.57	.00	.38	.00	.00	.95 *	1.71	23.53	4.74	.19	.00	.00	.38	30.55
TOTAL	2.28	2.09	.95	1.14	.38	.00	.19	7.02 *	49.15	30.36	6.26	1.33	.38	.00	3.98	91.46

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 7 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.52	1.90	.00	.00	.00	.00	.00	3.42 *	15.94	4.36	1.14	1.33	.57	.00	2.47	25.81
5 TO 9	.00	1.14	.38	.57	.19	.00	.00	2.28 *	30.55	.95	.38	.19	.00	.00	.57	32.64
10- UP	.00	.00	.95	.57	.19	.00	.00	1.71 *	1.90	25.81	3.98	.19	.00	.00	.19	32.07
TOTAL	1.52	3.04	1.33	1.14	.38	.00	.00	7.40 *	48.39	31.12	5.50	1.71	.57	.00	3.23	90.51

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 8 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.76	2.09	.00	.00	.00	.00	.00	2.85 *	7.02	1.33	3.04	1.14	1.33	.19	.95	14.99
5 TO 9	.00	.76	.95	1.14	.00	.00	.00	2.85 *	24.87	1.90	.57	.38	.00	.00	.76	28.27
10- UP	.00	.00	.95	.57	.38	.00	.00	1.90 *	2.47	39.66	5.12	.19	.00	.00	.38	47.82
TOTAL	.76	2.85	1.90	1.71	.38	.00	.00	7.59 *	34.16	42.88	8.73	1.71	1.33	.19	2.09	91.08

TABLE 3.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 9 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP			1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.95	1.71	.00	.00	.00	.00	.00	2.66	1.33	.95	1.52	1.33	.76	.19	.00	6.07
5 TO 9	.00	1.33	1.14	1.71	.00	.00	.00	4.17	18.41	.76	.38	.76	.00	.00	.95	21.25
10- UP	.00	.00	1.71	1.33	.00	.19	.00	3.23	2.28	51.04	8.35	.38	.00	.00	.19	62.24
TOTAL	.95	3.04	2.85	3.04	.00	.19	.00	10.06	22.01	52.75	10.25	2.47	.76	.19	1.14	89.56

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 10 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP			1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.95	.76	1.52	.19	.00	.00	3.42
5 TO 9	.00	.76	.76	3.23	.00	.00	.00	4.74	15.18	.95	.38	.57	.00	.00	.57	17.65
10- UP	.00	.00	1.14	1.33	.57	.19	.00	3.23	3.23	56.74	9.49	.19	.19	.00	.19	70.02
TOTAL	.00	.76	1.90	4.55	.57	.19	.00	7.97	18.41	58.63	10.65	2.28	.38	.00	.76	91.08

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 11 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP			1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.00	.38	.00	.00	.00	.00	.00	.38	.00	.19	.76	.95	.19	.00	.00	2.09
5 TO 9	.00	1.14	.38	1.52	.19	.00	.00	3.23	11.39	1.33	.38	.57	.38	.00	.19	14.23
10- UP	.00	.00	1.90	1.14	.38	.19	.00	3.61	3.04	61.10	11.01	.19	.38	.19	.00	75.90
TOTAL	.00	1.52	2.28	2.66	.57	.19	.00	7.21	14.42	62.62	12.14	1.71	.95	.19	.19	92.22

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TABLE 3.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 12 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.19	.00	.00	.00	.00	.00	.19	.00	.00	.19	.76	.38	.00	.00	1.33
5 TO 9	.00	.19	.19	.76	.00	.00	.00	1.14	11.95	1.14	.19	.38	.00	.00	.00	13.66
10- UP	.00	.00	1.90	1.52	.19	.19	.00	3.80	2.28	61.86	13.28	.95	.38	.57	.00	79.32
TOTAL	.00	.38	2.09	2.28	.19	.19	.00	5.12	14.23	63.00	13.66	2.09	.76	.57	.00	94.31

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 13 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.57	.38	.00	.00	.95
5 TO 9	.00	.38	.19	.76	.00	.00	.00	1.33	8.16	.95	.76	.38	.00	.00	.19	10.44
10- UP	.00	.00	1.52	.95	.38	.19	.00	3.04	.95	65.28	15.18	1.52	.00	.95	.19	84.06
TOTAL	.00	.38	1.71	1.71	.38	.19	.00	4.36	9.11	66.22	15.94	2.47	.38	.95	.38	95.45

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 14 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.19	.00	.38	.19	.38	.00	.00	1.14
5 TO 9	.00	.57	.19	1.33	.00	.00	.00	2.09	6.83	1.71	.00	.57	.57	.00	.00	9.68
10- UP	.00	.00	.76	.95	.19	.00	.00	1.90	1.71	65.84	15.75	.57	.57	.38	.00	84.82
TOTAL	.00	.57	.95	2.28	.19	.00	.00	3.98	8.73	67.55	16.13	1.33	1.52	.38	.00	95.64

TABLE 3.3. (Continued)

MSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 15 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 PERCENTAGES							TOTAL	RUNWAY 33 PERCENTAGES							
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS		1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.38	.19	.00	.38	.19	.00	.00	1.14
5 TO 9	.00	.38	.38	.00	.19	.00	.00	.95	9.30	1.71	.00	.76	.38	.00	.00	12.14
10- 0	.00	.00	1.14	.95	.38	.19	.00	2.66	.57	63.19	17.27	1.52	.38	.00	.00	82.92
TOTAL	.00	.38	1.52	.95	.57	.19	.00	3.61	10.25	65.09	17.27	2.66	.95	.00	.00	96.20

MSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 16 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 PERCENTAGES							TOTAL	RUNWAY 33 PERCENTAGES							
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS		1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	1.33	.00	.19	.19	.19	.19	.00	2.09
5 TO 9	.00	.57	.19	.19	.19	.00	.00	1.14	11.76	2.28	.38	.19	.19	.00	.00	16.00
10- 0	.00	.00	.95	.76	.00	.00	.00	1.71	.19	61.29	17.08	1.14	.19	.19	.00	80.08
TOTAL	.00	.57	1.14	.95	.19	.00	.00	2.85	13.29	63.57	17.65	1.52	.57	.38	.00	96.96

MSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 17 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 PERCENTAGES							TOTAL	RUNWAY 33 PERCENTAGES							
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS		1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	1.33	.00	.19	.38	.38	.00	.19	2.47
5 TO 9	.00	.19	.57	.19	.00	.00	.00	.95	16.70	2.28	.19	.00	.00	.00	.00	19.17
10- 0	.00	.00	1.14	.57	.38	.00	.00	2.09	.19	59.58	14.61	.38	.00	.19	.19	75.14
TOTAL	.00	.19	1.71	.76	.38	.00	.00	3.04	18.22	61.86	14.99	.76	.38	.19	.38	96.77

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TABLE 3.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 18 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.19	.19	.00	.00	.00	.00	.38		3.04	.38	.00	.19	.00	.00	.19	3.80
5 TO 9	.00	.57	.38	.38	.00	.00	.00	1.33	23.72	3.61	.19	.57	.00	.00	.19	28.27
10- UP	.00	.00	.38	.00	.38	.00	.00	.76	.38	55.22	9.68	.00	.00	.00	.00	65.28
TOTAL	.19	.76	.76	.38	.38	.00	.00	2.47	27.13	59.20	9.87	.76	.00	.00	.38	97.34

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 19 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.95	.95	.00	.00	.00	.00	.00	1.90	11.01	.57	.00	.00	.00	.00	.76	12.33
5 TO 9	.00	.95	.38	.57	.00	.00	.00	1.90	33.40	3.23	.19	.19	.00	.00	.19	37.19
10- UP	.00	.00	.76	.19	.00	.00	.00	.95	.19	39.47	5.50	.00	.00	.00	.00	45.16
TOTAL	.95	1.90	1.14	.76	.00	.00	.00	4.74	44.59	43.26	5.69	.19	.00	.00	.95	94.69

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 20 — NUMBER OBS 527

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.95	.95	.00	.00	.00	.00	.00	1.90	12.33	.76	.57	.19	.00	.00	1.52	15.37
5 TO 9	.00	1.90	.38	.19	.00	.00	.00	2.47	32.26	3.04	.38	.19	.00	.00	1.14	37.00
10- UP	.00	.00	.76	.00	.38	.00	.00	1.14	.38	36.05	5.12	.00	.19	.00	.00	41.75
TOTAL	.95	2.85	1.14	.19	.38	.00	.00	5.50	44.97	39.85	6.07	.38	.19	.00	2.66	94.12

TABLE 3.3. (Concluded)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 21 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	1.90	.95	.00	.00	.00	.00	.00	2.85 •	11.95	1.71	.38	.19	.19	.00	.57	14.99
5 TO 9	.00	1.14	.19	.38	.00	.00	.00	1.71 •	30.17	3.04	.19	.19	.00	.00	.57	34.16
10- UP	.00	.00	.38	.00	.19	.00	.00	.57 •	2.28	37.38	4.17	.00	.00	.00	.57	44.40
TOTAL	1.90	2.09	.57	.38	.19	.00	.00	5.12 •	44.40	42.13	4.74	.38	.19	.00	1.71	93.55

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 22 — NUMBER OBS. 526

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	2.28	1.90	.00	.00	.00	.00	.00	4.18 •	12.17	1.33	.19	.38	.00	.19	1.33	15.59
5 TO 9	.00	.57	.38	.19	.19	.00	.00	1.33 •	31.75	2.47	.00	.38	.00	.00	.57	35.17
10- UP	.00	.00	.38	.00	.19	.00	.00	.57 •	1.90	35.55	3.99	.19	.00	.00	.57	42.21
TOTAL	2.28	2.47	.76	.19	.38	.00	.00	6.08 •	45.82	39.35	4.18	.95	.00	.19	2.47	92.97

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MARCH

HOUR 23 — NUMBER OBS. 527

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	2.09	.95	.00	.00	.00	.00	.00	3.04 •	13.47	1.71	.19	.00	.19	.38	1.33	17.27
5 TO 9	.00	.76	.57	.38	.00	.00	.00	1.71 •	29.98	1.71	.57	.38	.00	.00	1.14	33.78
10- UP	.00	.00	.57	.00	.38	.19	.00	1.14 •	1.33	36.62	3.42	.00	.19	.00	.57	42.13
TOTAL	2.09	1.71	1.14	.38	.38	.19	.00	5.98 •	44.78	40.04	4.17	.38	.38	.38	3.04	93.17

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TABLE 3.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — HEAD/TAIL WIND REVERSALS
MONTH OF MARCH

HRS	*** RUNWAY 15 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD	*** RUNWAY 33 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD
00-02	5.07	2.85	2.22	2.98	50.00	7.10	2.98	4.12	47.96	4.39
03-05	5.96	3.30	2.66	3.48	51.22	7.60	3.68	3.93	51.33	4.23
06-08	8.87	4.94	3.93	5.34	53.45	10.77	5.07	5.70	56.34	6.27
09-11	7.86	5.11	4.75	3.39	56.39	8.30	4.94	3.36	54.55	3.69
12-14	4.56	2.03	2.53	2.12	56.34	4.82	2.72	2.09	55.84	2.20
15-17	3.04	1.33	1.71	1.37	54.00	3.04	1.71	1.33	50.94	1.38
18-20	4.69	2.79	1.90	2.91	44.78	5.32	2.03	3.30	43.84	3.46
21-23	6.59	2.99	3.61	3.16	63.33	7.79	4.25	3.55	62.62	3.81
00-23	5.83	2.92	2.92	3.08	54.20	6.84	3.42	3.42	53.60	3.66

3.4A

KSC PEAK WINDS — HEADWIND TO TAILWIND REVERSALS
MONTH OF MARCH

HRS	*** RUNWAY 15 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL	*** RUNWAY 33 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL
00-02	.99	1.33	.66	2.98	22.45	15.31	10.20	47.96
03-05	1.34	1.67	.47	3.48	18.58	15.93	16.81	51.33
06-08	1.58	2.26	1.51	5.34	14.79	15.49	26.06	56.34
09-11	.07	1.52	1.80	3.39	5.59	6.29	42.66	54.55
12-14	.00	.27	1.86	2.12	6.49	1.30	48.05	55.84
15-17	.37	.46	.85	1.37	3.77	3.77	43.40	50.94
18-20	.93	1.26	.73	2.91	12.33	15.07	16.44	43.84
21-23	1.41	1.21	.54	3.16	27.10	19.63	15.89	62.62
00-23	.79	1.24	1.05	3.08	14.52	12.24	26.80	53.60

3.4B

TABLE 3.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

HSC PEAK WINDS ---- HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF MARCH

RUNWAY COMPONENT CLASS (KNOTS)	*** RUNWAY 15 *** HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	*	HOURS 06-08 CPF	*** RUNWAY 33 *** HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF
0- 1	6.48	1.52	.40	.26	2.13	*	19.01	6.99	7.79	5.66	11.08
1- 2	11.06	4.07	1.19	.79	4.22	*	23.24	7.69	7.79	5.66	12.77
2- 3	14.27	4.49	1.52	1.31	5.32	*	33.80	9.79	7.79	5.66	17.11
3- 4	21.02	4.70	1.59	1.63	7.14	*	41.55	11.89	7.79	5.66	20.48
4- 5	26.42	4.90	1.59	2.16	8.65	*	55.63	18.19	9.09	5.66	27.71
5- 6	34.06	6.08	1.79	2.81	11.03	*	61.27	24.48	11.69	11.32	33.01
6- 7	39.32	8.15	2.05	3.92	13.18	*	64.79	27.97	12.99	16.98	36.39
7- 8	45.94	11.12	3.68	6.21	16.53	*	72.54	39.16	20.78	20.75	44.82
8- 9	50.99	15.68	5.50	7.97	19.80	*	78.87	50.35	29.87	28.30	53.49
9-10	60.27	24.24	13.38	18.03	28.75	*	83.10	62.98	40.26	35.85	62.17
10-11	66.35	31.22	19.40	24.43	35.12	*	86.62	66.43	46.75	39.62	66.27
11-12	69.76	36.95	24.58	30.05	40.09	*	86.62	70.63	49.35	45.28	68.92
12-13	74.61	44.82	34.17	38.99	47.95	*	90.14	73.43	54.55	60.38	73.98
13-14	78.02	50.21	39.60	44.68	52.94	*	90.85	76.92	61.04	64.15	77.11
14-15	81.37	57.39	47.35	52.06	59.37	*	95.07	85.31	75.32	71.70	85.06
15-16	84.30	63.47	53.91	58.52	64.90	*	95.77	88.81	79.22	75.47	87.71
16-17	86.83	69.06	61.32	64.60	70.32	*	97.18	94.41	90.91	88.68	93.98
17-18	89.35	74.31	66.75	69.56	74.87	*	97.18	95.10	94.81	88.68	94.94
18-19	91.74	81.56	74.30	76.62	80.95	*	97.89	97.20	97.40	92.45	96.87
19-20	94.61	88.33	82.98	84.06	87.42	*	99.30	99.30	98.70	94.34	98.55
20-21	95.56	91.02	86.36	85.96	89.65	*	99.30	99.30	98.70	96.23	98.80
21-22	97.13	93.02	90.07	88.96	92.24	*	100.00	100.00	100.00	98.11	99.76
22-23	97.41	94.34	91.26	90.53	93.33	*	******	******	******	98.11	99.76
23-24	97.95	95.86	94.30	92.88	95.21	*	******	******	******	98.11	99.76
24-25	98.23	97.51	95.63	94.19	96.36	*	******	******	******	98.11	99.76
25-26	98.50	98.07	96.95	95.36	97.20	*	******	******	******	98.11	99.76
26-27	98.70	98.62	97.81	96.73	97.95	*	******	******	******	98.11	99.76
27-28	98.98	98.96	98.21	98.00	98.54	*	******	******	******	98.11	99.76
28-29	99.32	99.17	98.68	98.37	98.87	*	******	******	******	98.11	99.76
29-30	99.73	99.59	99.27	99.02	99.40	*	******	******	******	98.11	99.76
30-31	99.73	99.79	99.54	99.28	99.58	*	******	******	******	98.11	99.76
31-32	99.80	100.00	99.67	99.48	99.73	*	******	******	******	100.00	100.00
32-33	99.86	******	99.80	99.80	99.87	*	******	******	******	******	******
33-34	100.00	******	99.93	99.93	99.97	*	******	******	******	******	******
34-35	******	******	99.93	99.93	99.97	*	******	******	******	******	******
35-36	******	******	100.00	99.93	99.98	*	******	******	******	******	******
36-37	******	******	******	99.93	99.98	*	******	******	******	******	******
37-38	******	******	******	99.93	99.98	*	******	******	******	******	******
38-39	******	******	******	99.93	99.98	*	******	******	******	******	******
39-40	******	******	******	99.93	99.98	*	******	******	******	******	******
40-41	******	******	******	99.93	99.98	*	******	******	******	******	******
41-42	******	******	******	100.00	100.00	*	******	******	******	******	******
NOBS	1465	1448	1510	1531	5958	*	142	143	77	53	815

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TABLE 4.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF APRIL

RUNWAY 15 - 33

HRS	CROSSWIND ***** CRITICAL LIMITS IN KNOTS ***** 1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	51.08	40.88	7.34	.68	.25	.06	3.71	1617
03-05	55.66	33.83	4.51	1.24	.31	.12	4.33	1617
06-08	45.12	43.51	5.93	1.61	.43	.19	3.21	1618
09-11	19.14	63.27	12.28	3.52	.68	.56	.56	1620
12-14	7.35	75.62	13.21	2.47	.80	.31	.25	1620
15-17	10.49	74.20	12.72	1.67	.25	.31	.37	1620
18-20	39.25	54.39	4.26	.56	.19	.06	1.30	1618
21-23	48.73	42.61	4.33	.56	.00	.00	3.77	1617
00-23	34.59	53.55	7.58	1.54	.36	.20	2.19	12947

TABLE 4.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF APRIL

HRS	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	1.67	.62	.25	1617	18.00	38.53	40.14
03-05	2.78	1.11	.56	1617	22.57	39.52	31.73
06-08	2.66	2.04	.80	1618	19.04	39.44	41.29
09-11	.49	2.28	2.72	1620	3.33	18.64	72.28
12-14	.68	.80	1.11	1620	.49	9.38	87.96
15-17	.80	.43	.80	1620	.43	13.64	84.32
18-20	.43	.31	.56	1618	7.91	36.77	53.21
21-23	1.30	1.11	.49	1617	14.97	37.29	43.66
00-23	1.17	1.09	.91	12947	10.84	28.39	56.84

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TABLE 4.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 0 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.11	.74	.00	.00	.00	.00	.00	1.86 *	13.91	.93	.37	.19	.00	.00	1.11	16.51
5 TO 9	.00	.56	.19	.00	.00	.00	.00	.74 *	32.28	2.41	.37	.00	.00	.00	2.04	37.11
10- UP	.00	.00	.00	.19	.00	.00	.00	.19 *	2.23	37.85	2.04	.00	.00	.19	.56	42.86
TOTAL	1.11	1.30	.19	.19	.00	.00	.00	2.78 *	48.42	41.19	2.78	.19	.00	.19	3.71	96.47

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 1 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.11	.93	.00	.00	.00	.00	.00	2.04 *	13.91	2.04	.19	.74	.19	.00	1.11	18.18
5 TO 9	.00	.37	.19	.00	.00	.00	.00	.56 *	32.84	2.97	1.11	.19	.00	.00	.93	38.03
10- UP	.00	.00	.19	.00	.00	.00	.00	.19 *	2.27	35.99	1.67	.19	.00	.00	.37	40.45
TOTAL	1.11	1.30	.37	.00	.00	.00	.00	2.78 *	48.98	41.00	2.97	1.11	.19	.00	2.41	96.66

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 2 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.93	.19	.00	.00	.00	.00	.00	1.11 *	14.47	2.78	.37	.00	.37	.00	1.30	19.29
5 TO 9	.00	.00	.19	.19	.19	.00	.00	.56 *	35.99	2.78	.56	.19	.00	.00	.93	40.45
10- UP	.00	.00	.37	.00	.00	.00	.00	.37 *	2.27	32.10	2.23	.19	.00	.00	.37	37.11
TOTAL	.93	.19	.56	.19	.19	.00	.00	2.04 *	52.69	37.66	3.15	.37	.37	.00	2.60	96.85

TABLE 4.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 3 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL
	PERCENTAGES			PERCENTAGES		
1 TO 4	.56 .74 .00 .00 .00 .00	.00	1.30	14.29 2.41 1.11 .74 .37 .19	1.86	20.96
5 TO 9	.00 .37 .56 .00 .00 .00	.00	.93	37.29 2.23 .74 .00 .00 .00	.74	41.00
10- UP	.00 .00 .19 .19 .00 .00	.00	.37	2.04 29.87 1.30 .19 .00 .00	.00	33.40
TOTAL	.56 1.11 .74 .19 .00 .00	.00	2.60	53.67 34.51 3.15 .93 .37 .19	2.60	95.36

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 4 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL
	PERCENTAGES			PERCENTAGES		
1 TO 4	1.67 1.86 .00 .00 .00 .00	.00	3.53	17.25 2.41 .93 .56 .19 .19	1.30	22.82
5 TO 9	.00 .56 .56 .00 .00 .00	.00	1.11	34.32 2.04 .19 .19 .00 .00	1.11	37.85
10- UP	.00 .00 .56 .19 .00 .00	.00	.74	1.30 27.83 2.78 .19 .00 .00	.19	32.28
TOTAL	1.67 2.41 1.11 .19 .00 .00	.00	5.38	52.88 32.28 3.90 .93 .19 .19	2.60	92.95

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 5 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL
	PERCENTAGES			PERCENTAGES		
1 TO 4	1.48 2.04 .00 .00 .00 .00	.00	3.53	18.92 2.23 .74 .37 .37 .00	1.30	23.93
5 TO 9	.00 .37 .74 .19 .00 .00	.00	1.30	36.73 1.30 .37 .37 .00 .00	.93	39.70
10- UP	.00 .00 .37 .19 .00 .00	.00	.56	1.11 29.23 2.41 .37 .00 .00	.37	29.50
TOTAL	1.48 2.41 1.11 .37 .00 .00	.00	5.38	56.77 28.76 3.53 1.11 .37 .00	2.60	93.14

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TABLE 4.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 6 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.67	1.67	.00	.00	.00	.00	.00	3.34 *	20.22	3.53	.93	.37	.19	.19	1.67	27.09
5 TO 9	.00	.74	.37	.19	.00	.00	.00	1.30 *	33.58	1.30	.56	.19	.00	.00	1.67	37.29
10- UP	.00	.00	.19	.19	.00	.00	.00	.37 *	1.30	26.16	1.67	.19	.00	.00	.37	29.68
TOTAL	1.67	2.41	.56	.37	.00	.00	.00	5.01 *	55.10	30.98	3.15	.74	.19	.19	3.71	94.06

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 7 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.30	1.86	.00	.00	.00	.00	.00	3.15 *	12.80	3.71	1.11	.37	.19	.00	1.48	19.67
5 TO 9	.00	.37	1.11	.56	.00	.00	.00	2.04 *	31.73	2.41	.74	.19	.00	.00	.56	35.62
10- UP	.00	.00	.56	.19	.00	.00	.00	.74 *	2.04	33.21	2.41	.00	.00	.00	.19	37.85
TOTAL	1.30	2.23	1.67	.74	.00	.00	.00	5.94 *	46.57	39.33	4.27	.56	.19	.00	2.23	93.14

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 8 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.56	.93	.00	.00	.00	.00	.00	1.48 *	3.70	2.41	2.04	1.11	.19	.37	.56	10.37
5 TO 9	.00	1.11	.74	.74	.19	.00	.00	2.78 *	29.07	1.67	.74	.00	.00	.00	.93	27.41
10- UP	.00	.00	.56	.56	.19	.00	.00	1.30 *	2.41	49.44	4.07	.00	.37	.00	.00	56.30
TOTAL	.56	2.04	1.30	1.30	.37	.00	.00	5.56 *	30.19	53.52	6.85	1.11	.56	.37	1.48	94.07

TABLE 4.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 9 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.19	.74	.00	.00	.00	.00	.00	.93	.93	2.41	1.48	.37	.37	.37	.00	5.93
5 TO 9	.00	.56	.56	.93	.19	.00	.00	2.22	19.44	1.11	.93	.56	.00	.00	.19	22.22
10- UP	.00	.00	1.67	1.11	.00	.00	.00	2.78	2.78	55.19	6.48	.56	.19	.19	.37	65.74
TOTAL	.19	1.30	2.22	2.04	.19	.00	.00	5.93	23.15	58.70	8.89	1.48	.56	.56	.56	93.89

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 10 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.19	.19	.00	.00	.00	.00	.00	.37	.00	.74	.93	.93	.19	.00	.00	2.78
5 TO 9	.00	1.11	.56	1.30	.69	.00	.00	3.96	16.11	.93	.56	.56	.00	.00	.19	18.33
10- UP	.00	.00	1.67	.74	.56	.19	.00	3.15	3.15	60.00	7.78	.56	.19	.37	.00	72.04
TOTAL	.19	1.30	2.22	2.04	.56	.19	.00	6.48	19.26	61.67	9.26	2.04	.37	.37	.19	93.15

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 11 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.19	.00	.00	.00	.00	.00	.19	.00	.37	.37	.37	.19	.00	.00	1.30
5 TO 9	.00	.19	.74	.74	.00	.00	.00	1.67	12.59	.56	1.48	.56	.00	.00	.19	15.37
10- UP	.00	.00	1.11	.74	.19	.19	.00	2.22	2.04	65.56	10.56	.56	.00	.37	.00	79.07
TOTAL	.00	.37	1.85	1.48	.19	.19	.00	4.07	14.63	66.48	12.41	1.48	.19	.37	.19	95.74

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TABLE 4.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 12 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00 *	.19	.00	.19	.19	.37	.00	.00	.93
5 TO 9	.00	.19	.19	.56	.00	.00	.00	.93 *	7.70	1.48	.37	.93	.19	.00	.00	10.74
10- UP	.00	.00	.74	.56	.19	.19	.00	1.67 *	1.11	72.22	11.30	.74	.00	.19	.00	85.56
TOTAL	.00	.19	.93	1.11	.19	.19	.00	2.59 *	9.07	73.70	11.85	1.85	.56	.19	.00	97.22

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 13 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00 *	.00	.00	.19	.00	.00	.00	.00	.19
5 TO 9	.00	.00	.37	.56	.19	.00	.00	1.11 *	6.67	1.48	.74	.93	.00	.00	.00	9.81
10- UP	.00	.00	.37	.19	.37	.00	.00	.93 *	.56	73.52	12.04	1.11	.19	.37	.00	87.78
TOTAL	.00	.00	.74	.74	.56	.00	.00	2.04 *	7.22	75.00	12.96	2.04	.19	.37	.00	97.78

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 14 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00 *	.00	.19	.00	.00	.19	.00	.00	.37
5 TO 9	.00	.00	.00	.37	.00	.00	.00	.37 *	5.00	2.22	.19	.19	.00	.00	.00	7.59
10- UP	.00	.00	.37	.00	.37	.00	.00	.74 *	.74	75.56	12.59	1.11	.37	.19	.00	90.56
TOTAL	.00	.00	.37	.37	.37	.00	.00	1.11 *	5.74	77.96	12.78	1.30	.56	.19	.00	98.52

TABLE 4.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 15 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00 *	.19	.00	.00	.00	.00	.19	.00	.37
5 TO 9	.00	.19	.19	.19	.00	.00	.00	.56 *	5.19	3.15	.19	.37	.00	.00	.00	8.89
10- UP	.00	.00	.56	.19	.00	.00	.00	.74 *	.56	73.89	13.52	.93	.19	.00	.00	89.07
TOTAL	.00	.19	.74	.37	.00	.00	.00	1.30 *	5.93	77.04	13.70	1.30	.19	.19	.00	98.33

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 16 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00 *	.00	.00	.00	.19	.19	.00	.00	.37
5 TO 9	.00	.00	.00	.37	.00	.00	.00	.37 *	10.00	2.41	.00	.74	.00	.00	.00	13.15
10- UP	.00	.00	.74	.19	.19	.00	.00	1.11 *	.56	70.74	12.22	.74	.00	.37	.00	84.63
TOTAL	.00	.00	.74	.56	.19	.00	.00	1.48 *	10.56	73.15	12.22	1.67	.19	.37	.00	98.15

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 17 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00 *	.37	.00	.00	.19	.00	.00	.00	.56
5 TO 9	.00	.19	.19	.00	.00	.00	.00	.37 *	14.63	3.70	.37	.19	.00	.00	.00	18.89
10- UP	.00	.00	.37	.19	.00	.00	.00	.56 *	.00	68.33	9.81	.56	.19	.37	.00	79.26
TOTAL	.00	.19	.56	.19	.00	.00	.00	.93 *	15.00	72.04	10.19	.93	.19	.37	.00	98.70

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TABLE 4.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 18 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	1.85	.00	.00	.00	.00	.00	.00	1.85
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00	24.26	6.48	.56	.19	.00	.00	.00	31.48
10- UP	.00	.00	.37	.19	.00	.00	.00	.56	.56	58.89	5.19	.19	.37	.19	.00	65.37
TOTAL	.00	.00	.37	.19	.00	.00	.00	.56	26.67	65.37	5.74	.37	.37	.19	.00	98.70

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 19 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.37	.37	.00	.00	.00	.00	.00	.74	7.98	.19	.00	.00	.00	.00	.37	8.53
5 TO 9	.00	.19	.19	.00	.00	.00	.00	.37	34.14	5.38	.00	.19	.00	.00	.19	39.89
10- UP	.00	.00	.74	.00	.00	.00	.00	.74	.56	44.71	3.34	.37	.00	.00	.00	48.98
TOTAL	.37	.56	.93	.00	.00	.00	.00	1.86	42.67	50.28	3.34	.56	.00	.00	.56	97.40

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 20 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.19	.37	.00	.00	.00	.00	.00	.56	12.47	.37	.00	.19	.00	.00	.37	13.36
5 TO 9	.00	.56	.00	.00	.00	.00	.00	.56	34.51	3.53	.19	.19	.00	.00	.56	38.96
10- UP	.00	.00	.19	.19	.00	.00	.00	.37	.93	42.12	2.04	.00	.19	.00	.00	45.27
TOTAL	.19	.93	.19	.19	.00	.00	.00	1.48	47.87	46.01	2.23	.37	.19	.00	.93	97.59

TABLE 4.3. (Concluded)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 21 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.93	.37	.00	.00	.00	.00	.00	1.30 *	13.17	.19	.19	.19	.00	.00	1.30	15.03
5 TO 9	.00	.93	.19	.00	.00	.00	.00	1.11 *	33.40	2.78	.37	.00	.00	.00	.56	37.11
10- UP	.00	.00	.37	.19	.00	.00	.00	.56 *	.93	39.52	3.15	.00	.00	.00	.00	43.60
TOTAL	.93	1.30	.56	.19	.00	.00	.00	2.97 *	47.50	42.49	3.71	.19	.00	.00	1.86	95.73

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 22 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.37	.00	.00	.00	.00	.00	.00	.37 *	12.43	1.67	.19	.00	.00	.00	1.11	15.40
5 TO 9	.00	.74	.37	.37	.00	.00	.00	1.46 *	72.84	2.60	.37	.00	.00	.00	1.48	37.29
10- UP	.00	.00	.37	.19	.00	.00	.00	.56 *	1.11	38.22	3.71	.19	.00	.00	.37	43.62
TOTAL	.37	.74	.74	.56	.00	.00	.00	2.41 *	86.38	42.49	4.27	.19	.00	.00	2.97	96.29

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF APRIL

HOUR 23 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.48	.74	.00	.00	.00	.00	.00	2.23 *	12.99	.56	.00	.00	.00	.00	.93	14.47
5 TO 9	.00	.37	.19	.19	.00	.00	.00	.74 *	33.77	2.04	.19	.00	.00	.00	1.48	37.48
10- UP	.00	.00	.19	.19	.00	.00	.00	.37 *	2.78	37.11	3.15	.19	.00	.00	.56	43.78
TOTAL	1.48	1.11	.37	.37	.00	.00	.00	3.34 *	49.54	39.70	3.34	.19	.00	.00	2.97	95.73

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TABLE 4.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — HEAD/TAIL WIND REVERSALS
MONTH OF APRIL

	*** RUNWAY 15 ***					*** RUNWAY 33 ***					
HRS	PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD	PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD	4.4A
00-02	3.09	1.49	1.55	1.53	60.98	4.09	1.86	2.23	55.56	2.31	
03-05	4.52	2.66	1.86	2.79	41.67	5.89	2.73	3.16	44.00	3.37	
06-08	6.51	3.41	3.10	3.61	56.18	7.25	3.59	3.66	57.43	3.90	
09-11	5.59	2.23	3.35	2.36	60.67	5.70	3.41	2.29	59.14	2.43	
12-14	2.42	.99	1.43	1.01	74.19	2.60	1.49	1.12	68.57	1.14	
15-17	1.61	.68	.93	.69	75.00	1.73	.93	.81	57.69	.82	
18-20	2.17	1.49	.68	1.51	52.38	2.73	.87	1.86	41.18	1.90	
21-23	2.58	1.24	1.30	1.28	44.68	3.22	1.73	1.49	42.42	1.55	
00-23	3.55	1.77	1.77	1.83	55.85	4.15	2.08	2.08	52.65	2.16	

KSC PEAK WINDS — HEADWIND TO TAILWIND REVERSALS
MONTH OF APRIL

	*** RUNWAY 15 ***				*** RUNWAY 33 ***				
	GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE				GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE				
HRS	>0 - 3	4 - 8	> 8	TOTAL	>0 - 3	4 - 8	> 8	TOTAL	4.4B
00-02	.64	.45	.45	1.53	20.37	14.81	20.37	55.56	
03-05	1.69	.84	.26	2.79	18.00	16.00	10.00	44.00	
06-08	1.11	1.84	.66	3.61	13.86	15.84	27.72	57.43	
09-11	.07	1.31	.98	2.36	6.45	6.45	46.24	59.14	
12-14	.00	.38	.63	1.01	2.86	.00	65.71	68.57	
15-17	.00	.13	.56	.69	.00	.00	57.69	57.69	
18-20	.38	.82	.31	1.51	17.65	5.88	17.65	41.18	
21-23	.38	.64	.26	1.28	18.18	13.64	10.61	42.42	
00-23	.53	.79	.51	1.83	13.36	11.20	28.09	52.65	

TABLE 4.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

ASC PEAK WINDS — HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF APRIL

RUNWAY COMPONENT CLASS (KNOTS)	••• RUNWAY 15 ••• HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	•	HOURS 06-08 CPF	••• RUNWAY 33 ••• HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF
0- 1	3.53	1.11	.25	.37	1.30	•	11.88	4.30	11.43	23.08	10.20
1- 2	6.67	2.78	.57	.50	2.58	•	15.84	4.30	11.43	23.08	11.76
2- 3	10.07	2.94	.63	.62	3.50	•	37.62	5.38	11.43	23.08	20.78
3- 4	15.57	3.33	.63	.69	4.96	•	46.53	10.75	11.43	23.08	26.27
4- 5	20.93	3.79	.76	.81	6.45	•	56.46	12.90	11.43	23.08	30.20
5- 6	29.69	4.90	1.20	1.37	9.12	•	64.36	18.28	14.29	30.77	37.25
6- 7	34.66	6.47	1.51	1.81	10.91	•	71.29	25.81	20.00	30.77	43.53
7- 8	40.29	8.95	2.14	2.87	13.33	•	78.22	33.33	34.29	34.62	51.37
8- 9	45.72	12.48	3.78	5.37	16.58	•	84.16	49.46	40.00	34.62	60.39
9-10	56.31	23.51	10.32	14.62	25.91	•	87.13	52.69	48.57	50.00	65.49
10-11	62.66	30.37	16.68	22.94	32.89	•	89.11	61.29	57.14	57.69	71.37
11-12	68.02	37.82	24.61	29.50	39.72	•	90.10	61.29	57.14	69.23	72.94
12-13	73.64	48.20	36.06	39.94	49.22	•	92.08	67.74	68.57	80.77	78.82
13-14	78.68	54.80	42.73	47.12	55.61	•	93.07	77.42	74.29	88.46	84.31
14-15	82.60	63.81	51.92	55.75	63.32	•	95.05	84.95	82.86	88.46	89.02
15-16	86.29	69.17	61.11	62.17	69.48	•	98.02	88.17	82.86	92.31	91.76
16-17	89.14	74.72	68.47	69.50	75.32	•	100.00	95.70	88.57	100.00	96.86
17-18	91.11	77.99	73.32	74.19	79.04	•	•••••••	96.77	88.57	•••••••	97.25
18-19	93.79	85.59	79.80	81.94	85.17	•	•••••••	97.85	94.29	•••••••	98.43
19-20	96.86	91.97	88.11	89.37	91.52	•	•••••••	100.00	94.29	•••••••	99.22
20-21	97.84	93.53	91.25	92.06	93.63	•	•••••••	•••••••	94.29	•••••••	99.22
21-22	98.56	96.15	94.21	94.50	95.82	•	•••••••	•••••••	94.29	•••••••	99.22
22-23	98.82	97.00	95.47	95.75	96.74	•	•••••••	•••••••	100.00	•••••••	100.00
23-24	99.35	97.71	96.79	97.56	97.84	•	•••••••	•••••••	•••••••	•••••••	•••••••
24-25	99.48	98.56	97.29	98.44	98.43	•	•••••••	•••••••	•••••••	•••••••	•••••••
25-26	99.60	98.95	97.86	98.81	98.85	•	•••••••	•••••••	•••••••	•••••••	•••••••
26-27	99.60	99.35	98.62	99.19	99.23	•	•••••••	•••••••	•••••••	•••••••	•••••••
27-28	99.80	99.48	99.12	99.56	99.49	•	•••••••	•••••••	•••••••	•••••••	•••••••
28-29	99.87	99.61	99.24	99.87	99.65	•	•••••••	•••••••	•••••••	•••••••	•••••••
29-30	100.00	99.74	99.75	99.87	99.84	•	•••••••	•••••••	•••••••	•••••••	•••••••
30-31	•••••••	99.87	99.94	99.87	99.92	•	•••••••	•••••••	•••••••	•••••••	•••••••
31-32	•••••••	99.93	99.94	99.94	99.95	•	•••••••	•••••••	•••••••	•••••••	•••••••
32-33	•••••••	99.93	99.94	100.00	99.97	•	•••••••	•••••••	•••••••	•••••••	•••••••
33-34	•••••••	99.93	99.94	•••••••	99.97	•	•••••••	•••••••	•••••••	•••••••	•••••••
34-35	•••••••	99.93	99.94	•••••••	99.97	•	•••••••	•••••••	•••••••	•••••••	•••••••
35-36	•••••••	99.93	99.94	•••••••	99.97	•	•••••••	•••••••	•••••••	•••••••	•••••••
36-37	•••••••	99.93	99.94	•••••••	99.97	•	•••••••	•••••••	•••••••	•••••••	•••••••
37-38	•••••••	99.93	99.94	•••••••	99.97	•	•••••••	•••••••	•••••••	•••••••	•••••••
38-39	•••••••	99.93	99.94	•••••••	99.97	•	•••••••	•••••••	•••••••	•••••••	•••••••
39-40	•••••••	100.00	99.94	•••••••	99.98	•	•••••••	•••••••	•••••••	•••••••	•••••••
40-41	•••••••	•••••••	99.94	•••••••	99.98	•	•••••••	•••••••	•••••••	•••••••	•••••••
41-42	•••••••	•••••••	99.94	•••••••	99.98	•	•••••••	•••••••	•••••••	•••••••	•••••••
42-43	•••••••	•••••••	99.94	•••••••	99.98	•	•••••••	•••••••	•••••••	•••••••	•••••••
43-44	•••••••	•••••••	99.94	•••••••	99.98	•	•••••••	•••••••	•••••••	•••••••	•••••••
44-45	•••••••	•••••••	99.94	•••••••	99.98	•	•••••••	•••••••	•••••••	•••••••	•••••••
45-46	•••••••	•••••••	99.94	•••••••	99.98	•	•••••••	•••••••	•••••••	•••••••	•••••••
46-47	•••••••	•••••••	99.94	•••••••	99.98	•	•••••••	•••••••	•••••••	•••••••	•••••••
47-48	•••••••	•••••••	99.94	•••••••	99.98	•	•••••••	•••••••	•••••••	•••••••	•••••••
48-49	•••••••	•••••••	100.00	•••••••	100.00	•	•••••••	•••••••	•••••••	•••••••	•••••••
NOBS	1529	1531	1589	1600	6249	•	101	93	35	26	255

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TABLE 5.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS - CROSSWINDS
MONTH OF MAY

RUNWAY 15 - 33

HRS	CROSSWIND ***** CRITICAL LIMITS IN KNOTS ***** 1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	59.74	30.65	3.23	.36	.06	.00	5.97	1674
03-05	67.26	23.78	2.03	.42	.06	.00	6.45	1674
06-08	51.79	38.59	4.54	.42	.18	.00	4.48	1674
09-11	23.06	65.59	8.19	1.67	.42	.12	.96	1674
12-14	8.06	78.38	10.51	1.91	.54	.30	.30	1674
15-17	11.17	76.61	11.47	1.08	.36	.06	.36	1674
18-20	38.29	55.14	4.36	.90	.24	.12	.96	1674
21-23	53.64	38.71	3.52	.42	.00	.00	3.70	1674
00-23	39.13	50.79	5.98	.90	.23	.07	2.90	13392

TABLE 5.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS - TAILWINDS
MONTH OF MAY

HRS	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	1.97	.66	.36	1674	19.89	48.45	27.12
03-05	2.63	.60	.30	1674	29.21	45.46	19.53
06-08	2.09	1.31	.84	1674	18.28	40.68	35.19
09-11	.12	1.61	.84	1674	2.63	24.43	70.19
12-14	.00	.66	.72	1674	.66	10.16	87.51
15-17	.00	.48	.66	1674	.96	13.68	84.05
18-20	.48	.66	.84	1674	7.35	37.63	52.75
21-23	1.14	.78	.36	1674	13.44	44.92	38.41
00-23	1.05	.84	.61	13392	11.55	33.18	51.84

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TABLE 5.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 0 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.25	.36	.00	.00	.00	.00	.00	1.61	14.52	1.43	.00	.18	.00	.00	1.08	17.20
5 TO 9	.00	.54	.18	.00	.00	.00	.00	.72	39.96	4.12	.54	.00	.00	.00	2.69	47.31
10- UP	.00	.00	.18	.18	.00	.00	.00	.36	.90	28.32	2.51	.00	.00	.00	.18	31.90
TOTAL	1.25	.90	.36	.18	.00	.00	.00	2.69	55.34	33.87	3.05	.18	.00	.00	3.94	96.42

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 1 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.08	.18	.00	.00	.00	.00	.00	1.25	15.41	2.15	.36	.00	.00	.00	1.97	19.89
5 TO 9	.00	.18	.54	.00	.00	.00	.00	.72	43.01	3.41	.72	.00	.00	.00	2.69	49.82
10- UP	.00	.00	.36	.00	.00	.00	.00	.36	1.08	23.30	1.08	.00	.18	.00	.00	25.63
TOTAL	1.08	.36	.90	.00	.00	.00	.00	2.33	59.50	28.85	2.15	.00	.18	.00	4.66	95.34

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 2 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.51	.54	.00	.00	.00	.00	.00	3.05	16.49	3.23	.00	.36	.00	.00	2.51	22.58
5 TO 9	.00	.18	.18	.18	.00	.00	.00	.54	41.76	3.41	.90	.00	.00	.00	2.15	48.21
10- UP	.00	.00	.18	.18	.00	.00	.00	.36	1.26	20.61	1.97	.00	.00	.00	.00	23.84
TOTAL	2.51	.72	.36	.36	.00	.00	.00	3.94	59.50	27.24	2.87	.36	.00	.00	4.66	94.62

TABLE 5.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 3 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.33	.54	.00	.00	.00	.00	.00	2.87	19.71	2.51	.00	.00	.18	.00	2.69	25.09
5 TO 9	.00	.36	.36	.00	.00	.00	.00	.72	43.91	3.05	.72	.18	.00	.00	1.08	48.92
10- UP	.00	.00	.18	.00	.00	.00	.00	.18	1.08	18.10	.90	.00	.00	.00	.18	20.25
TOTAL	2.33	.90	.54	.00	.00	.00	.00	3.76	64.70	23.66	1.61	.18	.18	.00	3.94	94.27

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 4 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.79	.36	.00	.00	.00	.00	.00	2.15	23.30	2.69	.36	.00	.00	.00	2.87	29.21
5 TO 9	.00	.18	.18	.36	.00	.00	.00	.54	42.47	1.97	.54	.18	.00	.00	1.43	46.59
10- UP	.00	.00	.00	.18	.00	.00	.00	.18	1.08	16.85	1.25	.00	.00	.00	.00	19.18
TOTAL	1.79	.54	.18	.36	.00	.00	.00	2.87	66.85	21.51	2.15	.18	.00	.00	4.30	94.98

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 5 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.97	.90	.00	.00	.00	.00	.00	2.87	26.16	4.12	.18	.18	.00	.00	2.69	33.33
5 TO 9	.00	.36	.18	.00	.00	.00	.00	.54	36.74	2.33	.36	.18	.00	.00	1.25	40.86
10- UP	.00	.00	.36	.18	.00	.00	.00	.54	1.25	17.03	.54	.00	.00	.00	.36	19.18
TOTAL	1.97	1.25	.54	.18	.00	.00	.00	3.94	64.16	23.48	1.08	.36	.00	.00	4.30	93.37

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TABLE 5.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 6 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.61	.90	.00	.00	.00	.00	2.51	26.16	2.51	.18	.00	.00	.00	2.69	31.54
5 TO 9	.00	.90	.00	.00	.00	.00	.90	37.48	1.97	.54	.36	.00	.00	1.43	41.78
10- UP	.00	.00	.18	.00	.18	.00	.36	.72	17.92	1.25	.00	.00	.00	.18	20.07
TOTAL	1.61	1.79	.18	.00	.18	.00	3.76	64.34	22.40	1.97	.36	.00	.00	4.30	93.37

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 7 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.61	1.25	.00	.00	.00	.00	.00	2.87	9.86	4.48	.90	.00	.00	.00	1.43	16.67
5 TO 9	.00	.90	.18	.00	.00	.00	.00	1.08	38.53	2.33	.54	.00	.00	.00	.72	42.11
10- UP	.00	.00	.72	.00	.18	.00	.00	.90	2.15	29.75	2.69	.00	.00	.00	.18	34.77
TOTAL	1.61	2.15	.90	.00	.18	.00	.00	4.84	50.54	36.56	4.12	.00	.00	.00	2.33	93.55

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 8 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15T	0TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCEN								PERCENTAGES							
1 TO 4	.36	.54	.00		.00	.00	.00	.90	2.51	3.58	.36	.18	.00	.00	.00	6.63
5 TO 9	.00	.72	1.08		.00	.00	.00	1.81	32.00	2.87	1.79	.18	.00	.00	1.25	38.17
10- UP	.00	.00	.72	.36	.18	.00	.00	1.25	2.33	45.16	2.51	.00	.00	.00	.72	50.72
TOTAL	.36	1.25	1.79	.54	.18	.00	.00	3.12	36.92	51.61	4.66	.36	.00	.00	1.97	95.52

TABLE 5.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 9 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.18	.00	.00	.00	.00	.00	.18	.72	2.51	1.25	.00	.00	.00	.00	4.48
5 TO 9	.00	.90	.72	.18	.18	.00	.00	1.97	24.37	1.08	1.61	1.08	.00	.00	1.08	29.21
10- UP	.00	.00	.54	.18	.18	.00	.00	.90	2.69	55.73	3.76	.00	.18	.00	.54	62.90
TOTAL	.00	1.08	1.25	.36	.36	.00	.00	3.05	27.78	59.32	6.63	1.08	.18	.00	1.61	96.59

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 10 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.18	.00	.00	.00	.00	.00	.18	.18	.72	.36	.36	.18	.00	.00	1.79
5 TO 9	.00	.00	1.08	.54	.00	.00	.00	1.61	21.53	1.43	1.61	.54	.00	.00	.18	25.09
10- UP	.00	.00	.54	.18	.00	.18	.00	.90	3.58	62.01	4.48	.00	.00	.00	.18	70.25
TOTAL	.00	.18	1.61	.72	.00	.18	.00	2.69	25.09	64.16	6.45	.90	.18	.00	.36	97.13

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 11 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.18	.36	.36	.54	.18	.00	.00	1.61
5 TO 9	.00	.36	.72	.18	.00	.00	.00	1.25	13.62	2.33	1.97	.72	.00	.00	.36	19.00
10- UP	.00	.00	.54	.00	.18	.00	.00	.72	2.51	69.00	5.02	.54	.18	.18	.00	77.42
TOTAL	.00	.36	1.25	.18	.18	.00	.00	1.97	16.31	71.68	7.35	1.79	.36	.18	.36	98.03

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TABLE 5.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 12 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	*	.00	.18	.36	.18	.00	.18	.00	.90
5 TO 9	.00	.00	.36	.18	.00	.00	.00	*	.72	1.61	7.19	8.24	.72	.36	.00	85.13
10- UP	.00	.00	.18	.36	.00	.18	.00	*	1.43	10.39	76.16	9.14	2.15	.36	.18	90.39
TOTAL	.00	.18	.54	.54	.00	.18	.00	*								

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 13 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	*	.18	.36	.36	.00	.00	.00	.00	.90
5 TO 9	.00	.00	.54	.18	.00	.00	.00	*	7.71	2.15	.36	.36	.18	.00	.00	10.75
10- UP	.00	.00	.18	.54	.18	.00	.00	*	.18	75.09	10.22	.72	.18	.00	.00	86.38
TOTAL	.00	.00	.72	.72	.18	.00	.00	*	8.06	77.60	10.93	1.08	.36	.00	.00	98.03

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 14 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	*	.00	.00	.00	.00	.18	.00	.00	.18
5 TO 9	.00	.36	.00	.00	.18	.00	.00	*	5.02	1.97	.18	.18	.00	.00	.00	7.35
10- UP	.00	.00	.18	.00	.18	.18	.00	*	.72	78.85	9.86	1.08	.18	.36	.00	91.04
TOTAL	.00	.36	.18	.00	.36	.18	.00	*	5.73	80.82	10.04	1.25	.36	.36	.00	98.57

TABLE 5.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 15 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.18	.18	.18	.00	.00	.54
5 TO 9	.00	.00	.18	.00	.18	.00	.00	.36	6.63	2.33	.00	.36	.18	.00	.36	9.86
10- UP	.00	.00	.36	.18	.18	.00	.00	.72	.54	76.16	10.93	.54	.18	.00	.00	88.35
TOTAL	.00	.00	.54	.18	.36	.00	.00	1.08	.17	78.49	11.11	1.08	.54	.00	.36	98.75

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 16 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.54	.00	.18	.00	.00	.00	.00	.72
5 TO 9	.00	.00	.00	.18	.00	.00	.36	.18	9.58	5.02	.00	.00	.00	.36	.00	14.52
10- UP	.00	.00	.36	.36	.18	.00	.00	.90	.90	70.61	11.11	.72	.00	.00	.18	83.51
TOTAL	.00	.00	.36	.54	.18	.00	.00	1.08	10.93	75.63	11.29	.72	.00	.00	.18	98.75

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 17 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.72	.72	.00	.00	.00	.18	.00	1.61
5 TO 9	.00	.54	.36	.00	.00	.00	.00	.90	13.80	2.69	.18	.00	.00	.00	.00	16.67
10- UP	.00	.00	.18	.18	.00	.00	.00	.36	.90	68.46	10.39	.54	.00	.00	.00	80.29
TOTAL	.00	.54	.54	.18	.00	.00	.00	1.25	15.41	71.86	10.57	.54	.00	.18	.00	98.57

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TABLE 5.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 18 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	2.69	.18	.00	.18	.00	.00	.00	3.05
5 TO 9	.00	.18	.18	.00	.00	.00	.00	.36	20.97	6.99	.00	.18	.00	.00	.00	28.14
10- UP	.00	.00	.36	.36	.18	.18	.00	1.08	1.08	60.39	5.02	.54	.00	.18	.00	67.20
TOTAL	.00	.18	.54	.36	.18	.18	.00	1.43	24.73	67.56	5.02	.90	.00	.18	.00	98.39

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 19 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.18	.18	.00	.00	.00	.00	.00	.36	6.81	.54	.00	.00	.00	.00	.18	7.53
5 TO 9	.00	.36	.00	.18	.00	.00	.00	.54	33.51	7.89	.54	.36	.00	.00	.36	42.65
10- UP	.00	.00	.36	.36	.18	.00	.00	.90	.90	43.19	3.41	.18	.00	.00	.00	47.67
TOTAL	.18	.54	.36	.54	.18	.00	.00	1.79	41.22	51.61	3.94	.54	.00	.00	.54	97.85

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 20 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.72	.36	.00	.00	.00	.00	.00	1.08	10.57	.36	.00	.00	.00	.00	.54	11.47
5 TO 9	.00	.90	.18	.00	.00	.00	.00	1.08	36.38	4.84	.18	.00	.00	.00	.72	42.11
10- UP	.00	.00	.00	.36	.18	.00	.00	.54	1.08	39.67	2.87	.00	.18	.00	.18	43.37
TOTAL	.72	1.25	.18	.36	.18	.00	.00	2.69	48.03	44.27	3.05	.00	.18	.00	1.43	96.95

TABLE 5.3. (Concluded)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 21 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.90	.18	.00	.00	.00	.00	.00	1.08 *	9.32	.90	.00	.18	.00	.00	1.08	11.47
5 TO 9	.00	.36	.36	.00	.00	.00	.00	.54 *	37.81	3.58	.36	.36	.00	.00	.72	42.83
10- UP	.00	.00	.18	.18	.00	.00	.00	.36 *	1.61	38.71	2.69	.00	.00	.00	.00	43.01
TOTAL	.90	.36	.54	.16	.00	.00	.00	1.97 *	48.75	43.19	3.05	.54	.00	.00	1.79	97.31

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 22 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.43	.18	.00	.00	.00	.00	.00	1.61 *	12.01	1.08	.00	.00	.00	.00	.90	13.98
5 TO 9	.00	.72	.36	.00	.00	.00	.00	1.08 *	38.53	3.41	.18	.00	.00	.00	2.15	44.27
10- UP	.00	.00	.18	.00	.00	.00	.00	.18 *	2.51	32.44	2.33	.18	.00	.00	.36	37.81
TOTAL	1.43	.90	.54	.00	.00	.00	.00	2.87 *	53.05	36.92	2.51	.18	.00	.00	3.41	96.06

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF MAY

HOUR 23 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.72	.00	.00	.00	.00	.00	.00	.72 *	12.01	1.25	.00	.00	.00	.00	1.61	14.87
5 TO 9	.00	.36	.18	.18	.00	.00	.00	.72 *	42.11	3.58	.54	.18	.00	.00	1.25	47.67
10- UP	.00	.00	.54	.00	.00	.00	.00	.54 *	1.97	29.57	2.69	.00	.00	.00	.18	34.41
TOTAL	.72	.36	.72	.18	.00	.00	.00	1.97 *	56.09	34.41	3.23	.18	.00	.00	3.05	96.95

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TABLE 5.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — HEAD/TAIL WIND REVERSALS
MONTH OF MAY

	*** RUNWAY 15 ***					*	*** RUNWAY 33 ***				
	PERCNTAGE REVERSALS TOTAL	PERCNTAGE REVERSALS HEAD-TAIL	PERCNTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCNTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCNTAGE REVERSALS TO HEAD	*	PERCNTAGE REVERSALS TOTAL	PERCNTAGE REVERSALS HEAD-TAIL	PERCNTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCNTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCNTAGE REVERSALS TO HEAD
HRS						*					
00-02	2.75	1.56	1.20	1.60	40.00	*	4.07	1.68	2.39	36.84	2.51
03-05	4.07	2.03	2.03	2.11	57.63	*	6.64	3.17	3.47	54.64	3.68
06-08	4.91	2.33	2.57	2.44	60.56	*	6.34	3.71	2.63	63.27	2.80
09-11	3.53	1.50	2.03	1.54	79.07	*	3.83	2.21	1.62	80.43	1.66
12-14	1.08	.48	.60	.49	43.48	*	1.56	.84	.72	50.00	.73
15-17	1.56	.84	.72	.85	63.16	*	1.80	.84	.96	63.64	.97
18-20	1.74	.96	.78	.98	39.39	*	1.92	.78	1.14	34.21	1.16
21-23	2.87	1.56	1.32	1.59	57.89	*	4.01	1.86	2.15	57.41	2.23
00-23	2.81	1.41	1.41	1.44	55.95	*	3.77	1.89	1.89	54.90	1.95

5.4A

KSC PEAK WINDS — HEADWIND TO TAILWIND REVERSALS
MONTH OF MAY

	*** RUNWAY 15 ***				*** RUNWAY 33 ***			
	GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE				GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE			
HRS	>0 - 3	4 - 8	> 8	TOTAL	>0 - 3	4 - 8	> 8	TOTAL
00-02	1.05	.43	.12	1.60	15.79	14.47	6.58	36.84
03-05	1.12	.68	.31	2.11	30.93	16.49	7.22	54.64
06-08	.56	1.25	.62	2.44	12.24	29.51	25.51	63.27
09-11	.00	1.04	.49	1.54	8.70	2.17	69.57	80.43
12-14	.00	.12	.36	.49	3.57	.00	46.43	50.00
15-17	.00	.30	.54	.85	18.18	13.64	31.82	63.64
18-20	.49	.31	.18	.98	7.89	13.16	13.16	34.21
21-23	.73	.49	.37	1.59	20.37	33.33	3.70	57.41
00-23	.49	.58	.38	1.44	16.78	17.21	20.92	54.90

5.4B

TABLE 5.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

MSC PEAK WINDS — HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF MAY

RUNWAY COMPONENT CLASS (KNOTS)	••• RUNWAY 15 ••• HOURS 06-09 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	•	••• RUNWAY 33 ••• HOURS 06-09 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF
0- 1	4.18	.61	.42	.24	1.35	•	28.57	6.52	17.86	13.64	20.10
1- 2	5.74	1.59	.67	.48	2.09	•	30.61	6.52	17.86	13.64	21.13
2- 3	9.11	1.78	.91	.79	3.10	•	43.88	6.52	17.86	13.64	27.84
3- 4	15.35	2.33	.91	.97	4.82	•	51.02	6.52	17.86	13.64	31.44
4- 5	20.77	2.88	.97	1.15	6.35	•	63.27	10.87	17.86	13.64	38.66
5- 6	30.57	5.21	1.33	1.69	9.56	•	72.45	34.78	28.57	27.27	52.06
6- 7	36.00	7.54	1.76	2.30	11.73	•	76.53	43.48	35.71	36.36	58.25
7- 8	42.42	11.34	2.60	3.81	14.85	•	81.63	52.17	35.71	40.91	63.40
8- 9	49.53	15.33	4.30	6.22	18.62	•	83.67	58.70	39.29	40.91	66.49
9-10	63.26	27.98	11.27	14.99	29.11	•	85.71	69.57	57.14	50.00	73.71
10-11	69.93	39.06	21.02	23.69	38.18	•	86.73	71.74	64.29	50.00	75.77
11-12	74.92	48.38	30.10	32.08	46.15	•	88.78	73.91	67.86	54.55	78.35
12-13	80.79	59.60	43.79	44.65	57.02	•	92.86	82.61	67.86	63.64	83.51
13-14	84.15	66.28	51.91	53.66	63.84	•	92.86	84.78	71.43	63.64	84.54
14-15	88.02	73.51	62.75	62.96	71.68	•	94.90	89.13	71.43	72.73	87.63
15-16	90.69	80.26	71.53	69.55	77.95	•	94.90	91.30	75.00	77.27	89.18
16-17	93.01	85.22	78.80	76.68	83.35	•	96.94	93.48	78.57	81.82	91.75
17-18	94.32	89.09	82.92	81.75	86.96	•	96.94	93.48	82.14	81.82	92.27
18-19	96.32	92.21	88.01	87.31	90.92	•	96.94	93.48	82.14	86.36	92.78
19-20	98.25	96.14	93.70	92.75	95.18	•	96.94	93.48	89.29	90.91	94.33
20-21	98.57	97.55	95.22	94.86	96.53	•	96.94	93.48	89.29	90.91	94.33
21-22	99.25	98.90	96.49	96.68	97.80	•	98.98	93.48	89.29	95.45	95.88
22-23	99.69	99.26	96.97	97.46	98.33	•	100.00	95.65	92.86	100.00	97.94
23-24	99.69	99.45	98.12	98.25	98.87	•	******	95.65	92.86	******	97.94
24-25	99.75	99.51	98.67	98.91	99.20	•	******	97.83	92.86	******	98.45
25-26	99.94	99.57	99.09	99.09	99.42	•	******	100.00	100.00	******	100.00
26-27	99.94	99.57	99.27	99.27	99.51	•	******	******	******	******	******
27-28	100.00	99.69	99.45	99.46	99.65	•	******	******	******	******	******
28-29	******	99.69	99.58	99.58	99.71	•	******	******	******	******	******
29-30	******	99.82	99.82	99.70	99.83	•	******	******	******	******	******
30-31	******	99.82	99.88	99.82	99.88	•	******	******	******	******	******
31-32	******	99.88	99.88	99.88	99.91	•	******	******	******	******	******
32-33	******	99.88	99.88	99.94	99.92	•	******	******	******	******	******
33-34	******	99.88	99.94	100.00	99.95	•	******	******	******	******	******
34-35	******	99.88	99.94	******	99.95	•	******	******	******	******	******
35-36	******	99.88	99.94	******	99.95	•	******	******	******	******	******
36-37	******	99.88	99.94	******	99.95	•	******	******	******	******	******
37-38	******	99.88	99.94	******	99.95	•	******	******	******	******	******
38-39	******	99.94	99.94	******	99.97	•	******	******	******	******	******
39-40	******	99.94	99.94	******	99.97	•	******	******	******	******	******
40-41	******	99.94	99.94	******	99.97	•	******	******	******	******	******
41-42	******	99.94	100.00	******	99.98	•	******	******	******	******	******
42-43	******	100.00	******	******	100.00	•	******	******	******	******	******
NOPS	1603	1631	1651	1655	6540	•	98	46	28	22	194

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TABLE 6.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF JUNE

RUNWAY 15 - 33

HRS	CROSSWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	66.01	22.37	2.53	.56	.00	.06	7.66	1618
03-05	70.25	15.67	2.22	.74	.25	.06	10.86	1620
06-08	60.68	26.77	3.02	.57	.37	.12	8.54	1620
09-11	34.65	57.44	5.31	.80	.25	.31	1.24	1619
12-14	14.57	73.64	9.44	1.36	.06	.31	.62	1620
15-17	19.63	66.48	10.69	1.73	.43	.37	.68	1620
18-20	44.94	46.48	4.20	1.05	.06	.12	3.15	1620
21-23	62.28	27.59	1.79	.49	.06	.06	7.26	1620
00-23	46.72	42.29	4.85	.97	.31	.18	4.78	12957

TABLE 6.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF JUNE

HRS	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	2.35	.00	.00	1618	37.31	41.76	21.14
03-05	2.96	.06	.00	1620	38.95	37.72	15.74
06-08	3.39	.37	.00	1620	22.90	44.75	26.36
09-11	.49	1.11	.00	1619	3.52	36.43	58.00
12-14	.06	.56	.12	1620	.43	18.02	80.43
15-17	.56	.62	.43	1620	1.67	22.53	73.83
18-20	.93	.43	.00	1620	11.48	39.94	46.23
21-23	1.85	.19	.00	1620	24.14	45.86	26.75
00-23	1.54	.42	.07	12957	17.05	35.90	43.47

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TABLE 6.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 0 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.48	.93	.00	.00	.00	.00	.00	2.41	23.19	3.71	.00	.00	.00	.00	3.71	30.61
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00	35.81	2.23	.93	.56	.00	.00	3.53	43.04
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	1.67	19.29	1.67	.19	.00	.00	.19	23.01
TOTAL	1.48	.93	.00	.00	.00	.00	.00	2.41	60.67	25.23	2.60	.74	.00	.00	7.42	96.66

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 1 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.66	.19	.00	.00	.00	.00	.00	2.04	26.16	3.53	.00	.00	.00	.00	3.34	33.02
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00	37.66	.74	.19	.19	.00	.00	2.23	41.00
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	1.11	19.11	1.48	.19	.00	.00	.00	21.89
TOTAL	1.66	.19	.00	.00	.00	.00	.00	2.04	64.94	23.38	1.67	.37	.00	.00	5.57	95.92

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 2 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.22	.19	.00	.00	.00	.00	.19	2.59	30.37	2.78	.00	.00	.00	.00	3.15	36.30
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00	37.41	.37	.93	.37	.00	.00	2.22	41.30
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	1.48	18.07	2.41	.19	.00	.19	.19	18.52
TOTAL	2.22	.19	.00	.00	.00	.00	.19	2.59	69.26	17.22	3.33	.56	.00	.19	5.56	96.11

TABLE 6.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 3 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.30	.19	.00	.00	.00	.00	.00	1.48 *	[illegible]	7.04	.00	.00	.00	.00	4.07	37.41
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00 *	[illegible]	.56	.56	.74	.00	.00	1.30	39.63
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	[illegible]	13.89	1.30	.19	.37	.00	.19	17.41
TOTAL	1.30	.19	.00	.00	.00	.00	.00	1.48 *	6[illegible].26	16.48	1.85	.93	.37	.00	5.56	94.44

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 4 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.59	.74	.00	.00	.00	.00	.37	3.70 *	31.30	2.41	.00	.00	.00	.00	3.70	37.41
5 TO 9	.00	.19	.00	.00	.00	.00	.00	.19 *	36.30	.56	.56	.19	.00	.00	.93	38.52
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	1.30	12.04	1.67	.37	.19	.00	.19	15.74
TOTAL	2.59	.93	.00	.00	.00	.00	.37	3.89 *	68.89	15.00	2.22	.56	.19	.00	4.81	91.67

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 5 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	3.52	.19	.00	.00	.00	.00	.00	3.70 *	33.52	2.96	.19	.00	.00	.00	5.37	42.04
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00 *	30.74	.74	.37	.56	.00	.00	2.59	35.00
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	.93	10.37	2.04	.19	.19	.19	.19	14.07
TOTAL	3.52	.19	.00	.00	.00	.0	.00	3.70 *	65.19	14.07	2.59	.74	.19	.19	8.15	91.11

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TABLE 6.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 6 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	3.70	1.30	.00	.00	.00	.00	.00	5.00 *	29.81	3.15	.00	.00	.00	.00	5.19	38.15
5 TO 9	.00	.19	.00	.00	.00	.00	.00	.19 *	29.81	.74	.74	.37	.00	.00	2.22	33.89
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	.93	13.52	1.30	.00	.56	.00	.19	16.48
TOTAL	3.70	1.48	.00	.00	.00	.00	.00	5.19 *	60.56	17.41	2.04	.37	.56	.00	7.59	88.52

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 7 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.85	1.67	.00	.00	.00	.00	.00	3.52 *	15.37	4.07	.19	.00	.00	.00	.93	20.56
5 TO 9	.00	.19	.00	.00	.00	.00	.00	.19 *	44.44	1.30	1.30	.19	.00	.00	1.67	48.89
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	1.67	21.11	2.04	.19	.19	.00	.37	25.56
TOTAL	1.85	1.85	.00	.00	.00	.00	.00	3.70 *	61.48	26.48	3.52	.37	.19	.00	2.96	95.00

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 8 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.19	.56	.00	.00	.00	.00	.00	.74 *	4.81	4.63	.37	.00	.00	.19	.00	10.00
5 TO 9	.00	.74	.00	.00	.00	.00	.00	.74 *	46.85	1.67	1.11	.56	.00	.00	1.30	51.48
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	2.59	31.30	2.04	.37	.37	.19	.19	37.04
TOTAL	.19	1.30	.00	.00	.00	.00	.00	1.48 *	54.26	37.59	3.52	.93	.37	.37	1.48	98.52

TABLE 6.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 9 — NUMBER OBS. 539

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	1.11	.00	.00	.00	.00	.00	1.11 *	1.48	3.15	.37	.00	.19	.00	.07	4.82
5 TO 9	.00	.37	.56	.00	.00	.00	.00	.93 *	41.93	1.86	.93	.37	.00	.00	1.67	46.75
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	2.60	40.45	2.41	.37	.00	.00	.56	46.38
TOTAL	.00	1.48	.56	.00	.00	.00	.00	2.04 *	46.01	45.45	3.34	.74	.19	.00	2.23	97.96

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 10 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.37	.00	.00	.00	.00	.00	.37 *	.37	1.48	1.11	.00	.19	.00	.00	3.15
5 TO 9	.00	.93	.56	.19	.00	.00	.00	1.67 *	31.11	2.22	1.48	.93	.00	.00	.37	36.11
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	1.67	53.15	3.33	.00	.00	.37	.00	58.52
TOTAL	.00	1.30	.56	.19	.00	.00	.00	2.04 *	33.15	56.85	5.93	.93	.00	.56	.37	97.78

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 11 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00 *	.19	1.11	.93	.19	.19	.00	.00	2.59
5 TO 9	.00	.19	.37	.00	.19	.00	.00	.74 *	73.52	2.22	.74	.37	.00	.00	.19	27.04
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	1.11	63.70	3.52	.00	.19	.37	.19	69.07
TOTAL	.00	.19	.37	.00	.19	.00	.00	.74 *	24.81	67.04	5.19	.56	.37	.37	.37	98.70

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TABLE 6.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 12 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.19	.00	.00	.00	.00	.00	.00	.19	.19	.19	.19	.00	.00	.00	.00	.56
5 TO 9	.00	.37	.19	.37	.00	.00	.00	.93	15.37	3.70	.93	.56	.00	.00	.00	20.56
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.74	67.41	8.52	.56	.00	.00	.19	77.41
TOTAL	.19	.37	.19	.37	.00	.00	.00	1.11	16.30	71.30	9.63	1.11	.00	.00	.19	98.52

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 13 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.19	.00	.00	.00	.19
5 TO 9	.00	.19	.00	.19	.00	.00	.00	.37	12.96	2.96	.74	.37	.00	.00	.19	17.22
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	1.11	72.41	7.59	.37	.19	.37	.00	82.04
TOTAL	.00	.19	.00	.19	.00	.00	.00	.37	14.07	75.37	8.33	.93	.19	.37	.19	99.44

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 14 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.19	.19	.00	.19	.00	.00	.00	.56
5 TO 9	.00	.00	.00	.37	.00	.00	.00	.37	12.22	3.15	.19	.37	.00	.00	.37	16.30
10- UP	.00	.00	.19	.00	.00	.19	.00	.37	.74	70.37	9.81	.56	.00	.37	.00	81.85
TOTAL	.00	.00	.19	.37	.00	.19	.00	.74	13.15	73.70	10.00	1.11	.00	.37	.37	98.70

TABLE 6.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 15 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.19	.19	.00	.00	.00	.00	.37	*	.19	.00	.00	.19	.00	.00	.00	.37
5 TO 9	.00	.00	.19	.19	.19	.00	.00	.56 *	12.96	3.33	1.11	.37	.37	.00	.56	18.70
10- UP	.00	.00	.00	.00	.00	.19	.00	.19 *	.93	65.74	10.56	1.67	.00	.56	.00	79.44
TOTAL	.19	.19	.19	.19	.19	.19	.00	1.11 *	14.07	69.07	11.67	2.22	.37	.56	.56	98.52

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 16 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.56	.00	.00	.00	.00	.00	.56 *	1.30	.37	.00	.00	.00	.00	.00	1.67
5 TO 9	.00	.00	.37	.00	.00	.00	.00	.37 *	15.56	4.44	.19	.37	.00	.00	.00	20.56
10- UP	.00	.00	.37	.37	.00	.00	.00	.74 *	1.48	63.33	10.19	.56	.00	.19	.00	75.74
TOTAL	.00	.56	.74	.37	.00	.00	.00	1.67 *	18.33	68.15	10.37	.93	.00	.19	.00	97.96

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 17 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.19	.56	.00	.00	.00	.00	.00	.74 *	2.41	.37	.00	.00	.19	.00	.00	2.96
5 TO 9	.00	.19	.19	.56	.00	.00	.00	.93 *	22.41	3.70	.93	.37	.19	.00	.74	28.33
10- UP	.00	.00	.19	.00	.19	.00	.00	.37 *	1.30	56.67	7.22	.56	.19	.19	.19	66.30
TOTAL	.19	.74	.37	.56	.19	.00	.00	2.04 *	26.11	60.74	8.15	.93	.56	.19	.93	97.59

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TABLE 6.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 18 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.37	.74	.00	.00	.00	.00	.00	1.11	5.00	1.11	.00	.19	.00	.00	.74	7.04
5 TO 9	.00	.19	.37	.00	.00	.00	.00	.56	25.93	5.19	.56	.19	.00	.00	.74	32.59
10- UP	.00	.00	.00	.00	.00	.00	.00	.0	1.30	50.19	5.74	.56	.00	.37	.00	58.15
TOTAL	.37	.93	.37	.00	.00	.00	.00	1.67	32.22	56.48	6.30	.93	.00	.37	1.48	97.78

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 19 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.37	.37	.00	.00	.00	.00	.00	.74	7.78	1.30	.00	.00	.00	.00	1.11	10.19
5 TO 9	.00	.37	.00	.00	.00	.00	.00	.37	36.11	3.89	.56	.93	.00	.00	1.11	42.59
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	2.22	39.63	2.59	.37	.00	.00	.74	45.56
TOTAL	.37	.74	.00	.00	.00	.00	.00	1.11	46.11	44.81	3.15	1.30	.00	.00	2.96	98.33

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 20 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.37	.56	.00	.00	.00	.00	.00	.93	15.93	1.11	.00	.00	.00	.00	.19	17.22
5 TO 9	.00	.37	.00	.00	.00	.00	.00	.37	37.78	3.89	.93	.56	.00	.00	1.48	44.63
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	1.67	30.56	1.85	.37	.19	.00	.37	35.00
TOTAL	.37	.93	.00	.00	.00	.00	.00	1.30	55.37	35.56	2.78	.93	.19	.00	2.04	96.85

TABLE 6.3. (Concluded)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 21 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.56	.56	.00	.00	.00	.00	.00	1.11 *	19.81	1.30	.00	.00	.00	.00	2.04	23.15
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00 *	37.78	3.33	.19	.93	.00	.00	1.67	43.89
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	1.85	26.30	1.11	.74	.00	.00	.56	30.56
TOTAL	.56	.56	.00	.00	.00	.00	.00	1.11 *	59.44	30.93	1.30	1.67	.00	.00	4.26	97.59

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 22 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.67	.19	.00	.00	.00	.00	.00	1.85 *	20.93	1.67	.37	.00	.00	.00	1.48	24.44
5 TO 9	.00	.37	.00	.00	.00	.00	.00	.37 *	38.52	3.15	.19	.37	.00	.00	3.52	45.74
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	2.04	21.48	1.67	.37	.00	.00	.00	25.56
TOTAL	1.67	.56	.00	.00	.00	.00	.00	2.22 *	61.48	26.30	2.22	.74	.00	.00	5.00	95.74

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JUNE

HOUR 23 — NUMBER OBS. 540

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.85	.56	.00	.00	.00	.00	.19	2.59 *	20.19	1.85	.37	.00	.00	.00	2.41	24.81
5 TO 9	.00	.19	.00	.00	.00	.00	.00	.19 *	40.37	2.96	.19	.37	.00	.00	4.07	47.96
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	1.30	18.89	1.30	.19	.00	.19	.19	22.04
TOTAL	1.85	.74	.00	.00	.00	.00	.19	2.78 *	61.85	23.70	1.85	.56	.00	.19	6.67	94.81

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TABLE 6.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS HEAD/TAIL WIND REVERSALS
MONTH OF JUNE

*** RUNWAY 15 ***

HRS	PERCNTAGE REVERSALS TOTAL	PERCNTAGE REVERSALS HEAD-TAIL	PERCNTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND TAIL WIND PERCNTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCNTAGE REVERSALS TO HEAD
00-02	3.03	1.36	1.67	1.39	71.05
03-05	5.07	3.15	1.92	3.25	63.27
06-08	4.27	1.61	2.66	1.67	76.79
09-11	2.16	.93	1.24	.94	76.92
12-14	1.11	.56	.56	.56	75.00
15-17	2.54	1.36	1.18	1.38	73.08
18-20	1.92	.87	1.05	.88	77.27
21-23	2.78	1.61	1.18	1.64	57.58
00-23	2.86	1.43	1.43	1.46	70.61

*** RUNWAY 33 ***

HRS	PERCNTAGE REVERSALS TOTAL	PERCNTAGE REVERSALS HEAD-TAIL	PERCNTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND TAIL WIND PERCNTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCNTAGE REVERSALS TO HEAD
00-02	5.94	2.60	3.34	68.85	3.47
03-05	9.52	3.77	5.75	49.59	6.22
06-08	6.74	4.95	1.79	82.47	1.91
09-11	2.41	1.30	1.11	70.00	1.13
12-14	1.36	.68	.68	61.11	.69
15-17	2.72	1.24	1.48	62.50	1.51
18-20	3.03	1.48	1.55	63.16	1.58
21-23	5.38	2.54	2.84	64.06	2.96
00-23	4.64	2.32	2.32	64.79	2.41

6.4A

KSC PEAK WINDS HEADWIND TO TAILWIND REVERSALS
MONTH OF JUNE

*** RUNWAY 15 ***

HRS	GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL
00-02	1.14	.25	.00	1.39
03-05	2.93	.32	.00	3.25
06-08	.83	.77	.06	1.67
09-11	.13	.63	.19	.94
12-14	.00	.25	.31	.56
15-17	.38	.69	.31	1.38
18-20	.69	.19	.00	.88
21-23	1.26	.38	.00	1.64
00-23	.92	.43	.11	1.46

*** RUNWAY 33 ***

HRS	GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL
00-02	36.07	24.59	8.20	68.85
03-05	32.52	17.07	.00	49.59
06-08	24.74	46.39	11.34	82.47
09-11	10.00	10.00	50.00	70.00
12-14	11.11	11.11	38.89	61.11
15-17	6.25	25.00	31.25	62.50
18-20	28.95	31.58	2.63	63.16
21-23	34.38	28.13	1.56	64.06
00-23	27.21	26.78	10.80	64.79

6.4B

TABLE 6.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF JUNE

RUNWAY COMPONENT CLASS (KNOTS)	••• RUNWAY 15 ••• HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	•	••• RUNWAY 33 ••• HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF
[illegible] 1	4.99	1.19	.99	.50	1.76	•	42.27	13.33	33.33	18.75	32.20
1- 2	7.10	2.01	.62	.63	2.56	•	53.61	13.33	33.33	18.75	36.47
2- 3	12.49	2.26	.62	.82	3.98	•	76.29	20.00	33.33	21.88	52.54
3- 4	20.08	2.95	.68	1.19	6.15	•	85.57	30.00	33.33	34.38	61.58
4- 5	26.34	3.83	.81	2.07	8.16	•	93.81	40.00	38.89	46.88	70.62
5- 6	37.92	6.65	1.68	3.51	12.30	•	94.85	63.33	44.44	56.25	77.40
6- 7	45.52	9.60	2.36	5.83	15.66	•	96.91	73.33	44.44	62.50	81.36
7- 8	54.03	14.12	3.92	6.59	19.97	•	97.94	80.00	61.11	65.63	85.31
8- 9	61.06	21.28	6.90	12.05	25.11	•	98.97	90.00	66.67	75.00	89.83
9-10	72.70	41.05	16.97	24.97	39.22	•	100.00	100.00	88.89	78.13	94.92
10-11	79.16	53.99	29.91	33.69	49.00	•	******	******	88.89	91.25	95.48
11-12	83.18	63.47	41.17	43.1	57.57	•	******	******	88.89	87.50	96.61
12-13	87.66	73.89	55.35	54.27	67.67	•	******	******	88.89	90.63	97.18
13-14	90.09	79.41	64.68	62.11	73.97	•	******	******	94.44	90.63	97.74
14-15	92.14	84.49	74.19	71.71	80.56	•	******	******	94.44	93.75	98.31
15-16	93.93	88.26	83.04	77.54	84.89	•	******	******	94.44	93.75	98.31
16-17	95.20	91.02	84.51	82.06	88.16	•	******	******	94.44	100.00	99.44
17-18	96.29	92.72	86.69	85.63	90.30	•	******	******	94.44	******	99.44
18-19	96.99	95.23	90.86	86.90	92.97	•	******	******	94.44	******	99.44
19-20	97.83	97.11	94.22	92.91	95.53	•	******	******	94.44	******	99.44
20-21	98.08	97.55	95.21	94.35	96.29	•	******	******	94.44	******	99.44
21-22	98.27	98.05	96.33	95.55	97.04	•	******	******	94.44	******	99.44
22-23	98.47	98.31	96.83	96.37	97.47	•	******	******	94.44	******	99.44
23-24	98.91	98.62	97.64	97.24	98.10	•	******	******	94.44	******	99.44
24-25	99.37	98.87	98.13	97.49	98.44	•	******	******	94.44	******	99.44
25-26	99.49	99.12	98.32	97.87	98.68	•	******	******	94.44	******	99.44
26-27	99.62	99.37	98.51	98.31	98.95	•	******	******	100.00	******	100.00
27-28	99.69	99.56	98.94	98.49	99.17	•	******	******	******	******	******
28-29	99.68	99.56	98.94	98.81	99.25	•	******	******	******	******	******
29-30	99.87	99.69	99.32	99.31	99.54	•	******	******	******	******	******
30-31	99.87	99.87	99.56	99.50	99.70	•	******	******	******	******	******
31-32	99.87	99.94	99.56	99.50	99.72	•	******	******	******	******	******
32-33	99.87	99.94	99.69	99.56	99.76	•	******	******	******	******	******
33-34	99.87	99.94	99.69	99.69	99.80	•	******	******	******	******	******
34-35	99.87	99.94	99.81	99.87	99.87	•	******	******	******	******	******
35-36	99.87	99.94	99.81	99.87	99.87	•	******	******	******	******	******
36-37	99.87	99.94	99.88	99.87	99.89	•	******	******	******	******	******
37-38	99.87	99.94	99.94	99.87	99.91	•	******	******	******	******	******
38-39	99.87	99.94	100.00	100.00	99.95	•	******	******	******	******	******
39-40	99.87	99.94	******	******	99.95	•	******	******	******	******	******
40-41	99.87	100.00	******	******	99.97	•	******	******	******	******	******
41-42	99.87	******	******	******	99.97	•	******	******	******	******	******
42-43	99.94	******	******	******	99.98	•	******	******	******	******	******
43-44	99.94	******	******	******	99.98	•	******	******	******	******	******
44-45	99.94	******	******	******	99.98	•	******	******	******	******	******
45-46	99.94	******	******	******	99.98	•	******	******	******	******	******
46-47	100.00	******	******	******	100.00	•	******	******	******	******	******
NO-G	1564	1593	1608	1594	6359	•	97	30	18	32	177

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TABLE 7.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF JULY

RUNWAY 15 - 33

	CROSSWIND ***** CRITICAL LIMITS IN KNOTS *****							
HRS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	71.80	13.98	.60	.18	.00	.00	13.44	1674
03-05	73.78	10.39	.24	.24	.00	.00	15.35	1674
06-08	64.73	21.28	2.15	.24	.00	.00	11.60	1673
09-11	41.60	50.75	4.84	.42	.00	.00	2.39	1673
12-14	16.79	74.13	7.35	.96	.06	.06	.66	1674
15-17	18.76	69.65	9.08	1.19	.24	.18	.90	1674
18-20	51.97	40.26	5.87	.36	.12	.00	4.42	1674
21-23	70.19	19.71	.64	.00	.00	.12	9.14	1674
00-23	51.20	37.52	3.50	.45	.05	.04	7.24	13390

TABLE 7.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF JULY

	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS				RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS		
HRS	1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	1.61	.00	.00	1674	34.83	47.43	11.89
03-05	1.85	.00	.00	1674	44.74	38.59	8.00
06-08	1.91	.42	.00	1673	28.45	47.28	17.39
09-11	.36	.42	.06	1673	4.60	42.98	51.11
12-14	.00	.42	.24	1674	.90	22.40	75.87
15-17	.18	.36	.24	1674	2.45	22.76	73.72
18-20	.66	.78	.00	1674	15.53	43.07	39.13
21-23	1.55	.12	.00	1674	28.38	49.82	17.74
00-23	1.02	.31	.06	13390	19.99	39.29	36.86

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TABLE 7.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 0 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES							
1 TO 4	1.08	.72	.00	.00	.00	.00	.00	1.79	*	26.70	2.87	.18	.00	.00	.00	3.58	33.33
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00	*	41.22	1.08	.54	.00	.00	.00	3.76	46.59
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	*	1.43	11.29	.36	.18	.00	.00	.36	13.62
TOTAL	1.08	.72	.00	.00	.00	.00	.00	1.79	*	69.35	15.23	1.08	.18	.00	.00	7.71	93.55

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 1 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES							
1 TO 4	1.08	.18	.00	.00	.00	.00	.00	1.25	*	25.81	2.15	.00	.00	.00	.00	3.76	31.72
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00	*	44.80	1.43	.00	.00	.00	.00	5.20	51.43
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	*	1.43	9.50	.18	.18	.00	.00	.18	11.47
TOTAL	1.08	.18	.00	.00	.00	.00	.00	1.25	*	72.04	13.08	.18	.18	.00	.00	9.14	94.62

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 2 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES							
1 TO 4	1.25	.18	.00	.00	.00	.00	.36	1.79	*	32.26	2.33	.00	.00	.00	.00	4.84	39.43
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00	*	37.63	1.08	.18	.18	.00	.00	5.20	44.27
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	*	.72	9.14	.36	.00	.00	.00	.36	10.57
TOTAL	1.25	.18	.00	.00	.00	.00	.36	1.79	*	70.61	12.54	.54	.18	.00	.00	10.39	94.27

TABLE 7.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 3 — NUMBER OBS. 558

TAIL-IND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.61	.18	.00	.00	.00	.00	.36	2.15 *	34.05	2.69	.00	.00	.00	.00	5.73	42.47
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00 *	36.92	.90	.00	.00	.00	.00	3.23	41.04
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	1.25	7.71	.18	.18	.00	.00	.00	9.32
TOTAL	1.61	.18	.00	.00	.00	.00	.36	2.15 *	72.22	11.29	.18	.18	.00	.00	8.96	92.83

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 4 — NUMBER OBS. 558

TAIL-IND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.90	.18	.00	.00	.00	.00	.18	1.25 *	37.29	2.69	.00	.00	.00	.00	3.76	43.73
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00 *	37.29	.00	.00	.36	.00	.00	2.69	40.32
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	.54	6.99	.00	.00	.00	.00	.18	7.71
TOTAL	.90	.18	.00	.00	.00	.00	.18	1.25 *	75.09	9.68	.00	.36	.00	.00	6.63	91.76

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 5 — NUMBER OBS. 558

TAIL-IND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.79	.36	.00	.00	.00	.00	.00	2.15 *	37.81	2.87	.00	.00	.00	.00	7.35	48.03
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00 *	31.36	.54	.18	.18	.00	.00	2.15	34.41
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	.54	6.09	.36	.00	.00	.00	.00	6.99
TOTAL	1.79	.36	.00	.00	.00	.00	.00	2.15 *	69.71	9.50	.54	.18	.00	.00	9.50	89.43

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TABLE 7.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 6 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.15	.18	.00	.00	.00	.00	.00	2.33 •	36.92	2.69	.00	.00	.00	.00	6.27	45.88
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00 •	30.82	.72	.36	.00	.00	.00	2.15	34.05
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 •	.72	6.81	.54	.18	.00	.00	.18	8.42
TOTAL	2.15	.18	.00	.00	.00	.00	.00	2.33 •	68.46	10.22	.90	.18	.00	.00	8.60	88.35

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 7 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.61	.36	.00	.00	.00	.00	.00	1.97 •	19.89	4.30	.36	.00	.00	.00	2.69	27.24
5 TO 9	.00	.18	.00	.18	.00	.00	.00	.36 •	44.27	1.61	1.25	.18	.00	.00	3.58	50.90
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 •	.36	15.05	.36	.00	.00	.00	.18	15.95
TOTAL	1.61	.54	.00	.18	.00	.00	.00	2.33 •	64.52	20.97	1.97	.18	.00	.00	6.45	94.09

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 8 — NUMBER OBS. 557

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.72	.72	.00	.00	.00	.00	.00	1.44 •	6.82	3.95	.18	.00	.00	.00	1.26	12.21
5 TO 9	.00	.72	.18	.00	.00	.00	.00	.90 •	48.65	1.62	2.15	.36	.00	.00	4.31	56.91
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 •	1.26	24.96	1.08	.00	.00	.00	.54	27.83
TOTAL	.72	1.44	.18	.00	.00	.00	.00	2.33 •	56.77	30.52	3.41	.18	.00	.00	6.10	96.95

TABLE 7.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 9 — NUMBER OBS. 557

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.18	.54	.00	.00	.00	.00	.00	.72 *	3.95	2.51	.72	.00	.00	.00	.54	7.72
5 TO 9	.00	.54	.18	.00	.00	.00	.00	.72 *	42.55	7.59	3.05	.00	.00	.00	1.44	59.63
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	2.51	34.65	1.62	.18	.00	.00	.72	39.68
TOTAL	.18	1.08	.18	.00	.00	.00	.00	1.44 *	49.01	40.75	5.39	.18	.00	.00	2.69	98.03

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 10 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.18	.00	.00	.00	.00	.00	.18 *	2.51	1.61	.18	.00	.00	.00	.00	4.30
5 TO 9	.00	.00	.18	.00	.00	.00	.00	.18 *	38.53	2.15	2.15	.36	.00	.00	.90	44.09
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	2.87	45.88	1.43	.18	.00	.00	.54	50.90
TOTAL	.00	.18	.18	.00	.00	.00	.00	.36 *	43.91	49.64	3.76	.54	.00	.00	1.43	99.28

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 11 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.18	.00	.00	.00	.00	.00	.18 *	.54	.72	.36	.18	.00	.00	.00	1.79
5 TO 9	.00	.18	.18	.00	.00	.00	.00	.36 *	28.32	3.58	1.61	.18	.00	.00	.54	34.23
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	2.87	55.91	2.87	.18	.00	.00	.90	62.72
TOTAL	.00	.36	.18	.00	.00	.00	.00	.54 *	31.72	60.22	4.84	.54	.00	.00	1.43	98.75

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TABLE 7.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 12 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.18	.18	.18	.00	.00	.00	.00	.54
5 TO 9	.00	.18	.54	.00	.00	.00	.00	.72	19.89	5.73	1.25	.36	.00	.00	.72	27.96
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	1.43	65.23	3.58	.00	.00	.00	.00	70.25
TOTAL	.00	.18	.54	.00	.00	.00	.00	.72	21.51	71.15	5.02	.36	.00	.00	.72	98.75

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 13 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.36	.18	.18	.00	.00	.00	.00	.72
5 TO 9	.00	.00	.18	.00	.00	.00	.00	.18	15.23	5.20	.54	.36	.00	.00	.18	21.51
10- UP	.00	.00	.18	.00	.00	.18	.00	.36	1.08	69.71	6.09	.36	.00	.00	.00	77.24
TOTAL	.00	.00	.36	.00	.00	.18	.00	.54	16.67	75.09	6.81	.72	.00	.00	.18	99.46

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 14 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.36	.36	.36	.18	.00	.00	.18	1.43
5 TO 9	.00	.18	.18	.00	.00	.00	.00	.36	11.29	4.84	.18	1.08	.00	.00	.36	17.74
10- UP	.00	.00	.18	.18	.00	.00	.00	.36	.54	70.61	8.42	.36	.18	.00	.00	80.11
TOTAL	.00	.18	.36	.18	.00	.00	.00	.72	12.19	75.81	8.96	1.61	.18	.00	.54	99.28

TABLE 7.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF JULY

HOUR 15 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (PERCENTAGES)							TOTAL	RUNWAY 33 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS		1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.00	.18	.00	.00	.00	.00	.00	.18	.54	.90	.00	.36	.00	.00	.18	2.15
5 TO 9	.00	.00	.18	.00	.00	.00	.00	.18	13.26	8.66	.54	.00	.00	.00	.18	16.64
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	1.08	68.46	8.26	.72	.00	.18	.00	78.67
TOTAL	.00	.18	.18	.00	.00	.00	.00	.36	14.87	76.01	8.78	1.08	.00	.36	.36	99.46

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF JULY

HOUR 16 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (PERCENTAGES)							TOTAL	RUNWAY 33 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS		1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.00	.18	.00	.00	.00	.00	.00	.18	.90	.54	.18	.18	.18	.00	.18	2.15
5 TO 9	.00	.18	.00	.00	.18	.00	.00	.36	16.30	3.96	.72	.72	.00	.00	.18	19.89
10- UP	.00	.00	.36	.18	.00	.00	.00	.54	.36	68.10	7.35	.36	.18	.18	.00	76.52
TOTAL	.00	.36	.36	.18	.18	.00	.00	1.08	15.59	72.58	8.26	1.25	.36	.18	.36	98.57

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF JULY

HOUR 17 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (PERCENTAGES)							TOTAL	RUNWAY 33 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS		1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.18	.00	.00	.00	.00	.00	.00	.18	1.43	.54	.18	.00	.18	.00	.72	3.05
5 TO 9	.00	.36	.00	.18	.00	.00	.00	.54	22.98	4.38	.90	.36	.00	.00	.18	29.75
10- UP	.00	.00	.18	.00	.00	.00	.00	.18	1.26	55.56	8.42	.54	.00	.00	1.08	65.95
TOTAL	.18	.36	.18	.18	.00	.00	.00	.90	25.67	61.87	9.50	.90	.18	.00	1.08	98.75

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TABLE 7.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 18 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.18	.36	.00	.00	.00	.00	.00	.54 *	4.12	.90	.00	.54	.18	.00	.72	6.45
5 TO 9	.00	.18	.54	.18	.00	.00	.00	.90 *	30.20	3.94	.36	.00	.00	.00	.90	35.48
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	.90	49.82	4.12	.00	.00	.00	1.08	55.91
TOTAL	.18	.54	.54	.18	.00	.00	.00	1.43 *	35.30	54.66	4.48	.54	.18	.00	2.69	97.85

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 19 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.36	.18	.00	.00	.00	.00	.00	.54 *	13.26	1.25	.18	.00	.18	.00	.72	15.59
5 TO 9	.00	.72	.18	.00	.00	.00	.00	.90 *	39.07	4.84	.72	.18	.00	.00	3.05	47.85
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	1.97	31.00	1.08	.00	.00	.00	.18	34.23
TOTAL	.36	.90	.18	.00	.00	.00	.00	1.43 *	54.30	37.10	1.97	.18	.18	.00	3.94	97.67

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF JULY

HOUR 20 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.72	.18	.00	.00	.00	.00	.00	.90 *	19.71	2.15	.00	.00	.00	.00	2.69	24.55
5 TO 9	.00	.54	.00	.00	.00	.00	.00	.54 *	41.94	2.33	.18	.18	.00	.00	1.25	45.88
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	3.41	22.40	1.25	.00	.00	.00	.18	27.24
TOTAL	.72	.72	.00	.00	.00	.00	.00	1.43 *	65.05	26.88	1.43	.18	.00	.00	4.12	97.67

TABLE 7.2. (Concluded)

[illegible] PEAK WINDS — TAILWINDS VS CROSSWINDS
[illegible] OF JULY

[illegible] 21 — NUMBER SAMPLES: 598

TAILWIND LIMITS	NUMBER IN 000 CROSSWIND LIMITS 000 1 TO 5 TO 10	10TO15	15TO20	20TO25	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES						
1 TO 5	2.28	.33	.09	.03	.00	.00	.36
5 TO 9	.36	.18	.09	.06	.00	.00	.36
10- UP	.09	.03	.00	.06	.03	.03	.09
TOTAL	2.53	.54	.03	.03	.09	.03	.09

TOTAL	NUMBER IN 000 CROSSWIND LIMITS 000 1 TO 5 TO 10	10TO15	15TO20	20TO25	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES						
1.75	21.51	2.51	.27	.00	.00	.00	1.61	25.63
.18	05.14	7.23	.18	.96	.60	.30	3.50	52.15
.72	2.27	19.65	.54	.32	.00	.18	.18	19.18
1.03	69.5?	21.66	.72	.00	.30	.18	5.38	96.95

[illegible] PEAK WINDS — TAILWINDS VS CROSSWINDS
[illegible] OF JULY

[illegible] 22 — NUMBER SAMPLES: 598

TAILWIND LIMITS	NUMBER IN 000 CROSSWIND LIMITS 000 1 TO 5 TO 10	10TO15	15TO20	20TO25	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES						
1 TO 5	2.63	.03	.00	.00	.00	.00	.00
5 TO 9	.00	.18	.00	.00	.00	.00	.00
10- UP	.03	.03	.00	.00	.00	.00	.00
TOTAL	2.63	.18	.00	.00	.00	.00	.00

TOTAL	NUMBER IN 000 CROSSWIND LIMITS 000 1 TO 5 TO 10	10TO15	15TO20	20TO25	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES						
1.61	22.59	1.79	.00	.00	.00	.00	3.01	27.78
.18	03.37	3.79	.30	.90	.60	.90	3.76	64.06
.00	1.79	10.67	.36	.00	.00	.18	.36	17.74
1.79	47.76	10.06	.92	.00	.00	.18	7.71	90.98

[illegible] PEAK WINDS — TAILWINDS VS CROSSWINDS
[illegible] OF JULY

[illegible] 23 — NUMBER SAMPLES: 598

TAILWIND LIMITS	NUMBER IN 000 CROSSWIND LIMITS 000 1 TO 5 TO 10	10TO15	15TO20	20TO25	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES						
1 TO 5	2.63	.36	.00	.00	.00	.00	.36
5 TO 9	.00	.00	.00	.00	.00	.00	.00
10- UP	.00	.00	.00	.00	.00	.00	.00
TOTAL	2.63	.36	.00	.00	.00	.00	.36

TOTAL	NUMBER IN 000 CROSSWIND LIMITS 000 1 TO 5 TO 10	10TO15	15TO20	20TO25	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES						
1.79	25.59	1.97	.00	.00	.00	.00	3.76	31.72
.00	02.29	7.35	.50	.90	.30	.36	2.87	57.85
.00	1.43	17.95	.36	.36	.60	.00	.54	16.31
1.79	69.71	10.15	.92	.00	.00	.00	7.17	95.88

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TABLE 7.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS HEAD/TAIL WIND REVERSALS
MONTH OF JULY

HRS	*** RUNWAY 15 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD	*** RUNWAY 33 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD
10-02	2.51	1.32	1.20	1.34	74.07	6.82	3.29	3.53	56.12	3.75
03-05	2.44	1.26	1.20	1.28	64.52	9.63	4.07	5.57	96.90	6.09
06-08	2.64	1.20	1.50	1.23	64.10	6.22	4.73	1.50	68.70	1.61
09-11	1.38	.54	.76	.54	100.00	1.68	.96	.72	72.73	.73
12-14	.96	.42	.54	.42	81.82	1.20	.72	.48	85.71	.48
15-17	1.68	1.02	.66	1.03	84.62	2.93	.90	1.44	83.33	1.45
18-20	2.15	1.08	1.08	1.09	75.00	3.41	1.56	1.86	68.42	1.90
21-23	2.08	1.08	.96	1.10	57.14	5.33	2.09	3.23	51.47	3.37
00-24	1.97	.99	.99	1.00	70.97	4.58	2.29	2.29	59.07	2.38

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KSC PEAK WINDS HEADWIND TO TAILWIND REVERSALS
MONTH OF JULY

HRS	*** RUNWAY 15 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL	*** RUNWAY 33 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL
00-02	1.34	.00	.00	1.34	34.69	21.43	.00	56.12
03-05	1.16	.12	.00	1.28	23.79	12.41	.69	96.90
06-08	.80	.31	.12	1.23	26.09	33.91	8.70	68.70
09-11	.12	.42	.00	.54	13.64	22.73	36.36	72.73
12-14	.00	.30	.12	.42	7.14	28.57	50.00	85.71
15-17	.18	.54	.72	1.03	.00	38.89	44.44	83.33
18-20	.55	.43	.12	1.09	15.79	28.95	23.68	68.42
21-23	.91	.18	.00	1.10	27.94	23.53	.00	51.47
00-24	.62	.29	.08	1.00	27.41	23.36	8.30	59.07

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TABLE 7.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

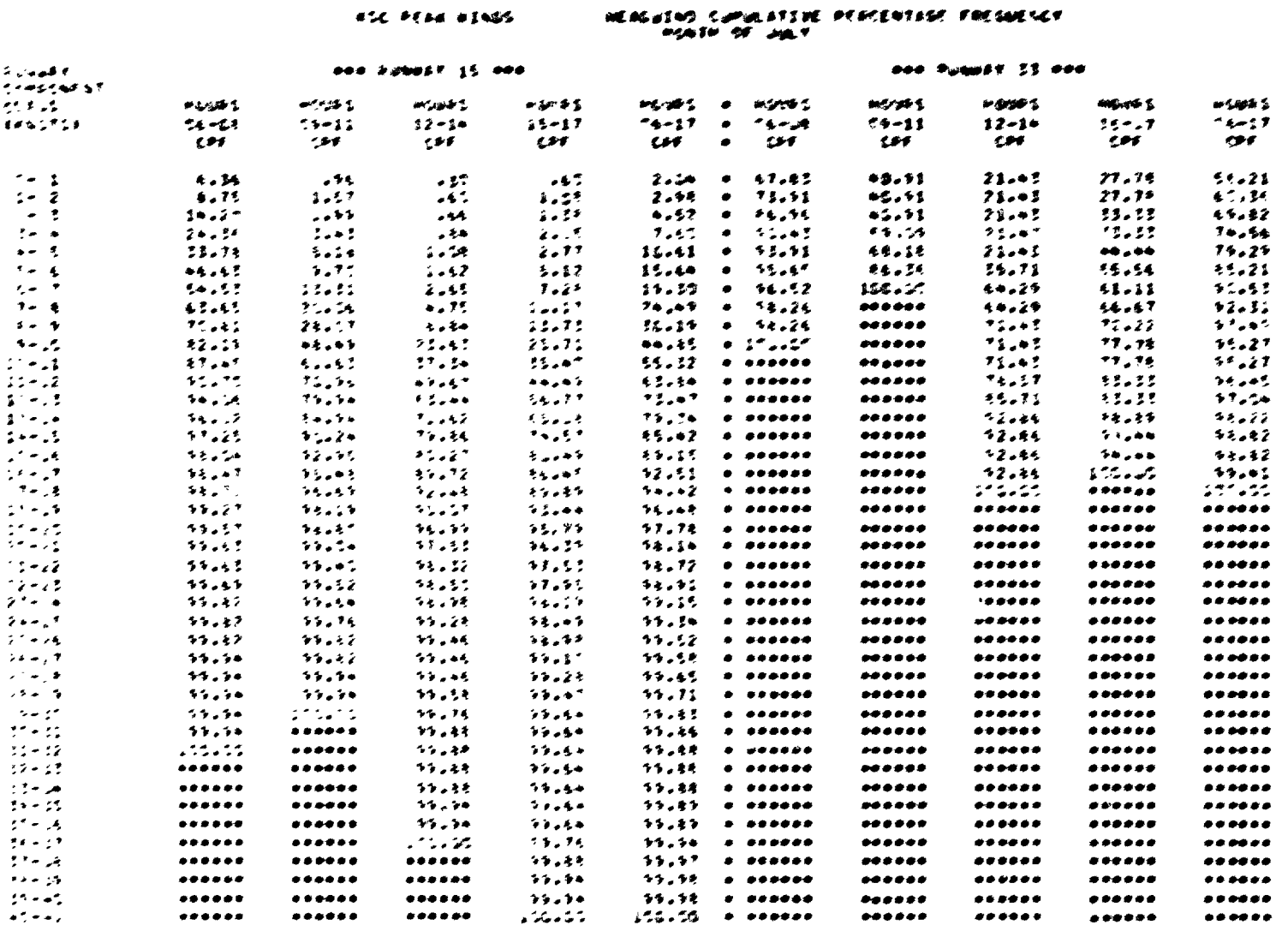

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TABLE 8.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF AUG.

RUNWAY 15 - 33

HRS	CROSSWIND ***** CRITICAL LIMITS IN KNOTS ***** 1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	73.12	10.81	.78	.00	.18	.06	15.11	1674
03-05	72.52	8.54	.42	.18	.00	.00	18.34	1674
06-08	69.18	15.29	1.67	.24	.00	.00	13.62	1674
09-11	46.09	44.21	3.88	.24	.00	.00	3.58	1674
12-14	21.51	70.49	5.44	.60	.18	.06	1.73	1674
15-17	26.46	63.02	6.81	1.02	.24	.30	2.15	1674
18-20	65.29	27.78	1.61	.48	.06	.00	4.78	1674
21-23	72.40	14.28	1.02	.60	.00	.06	11.65	1674
00-23	56.07	31.80	2.70	.42	.08	.05	8.87	13392

TABLE 8.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF AUG.

HRS	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	1.61	.24	.00	1674	46.06	19.43	7.29
03-05	3.17	.18	.00	1674	52.03	31.42	5.38
06-08	3.52	.30	.00	1674	37.34	40.50	13.32
09-11	.90	.84	.18	1674	4.42	49.10	43.25
12-14	.12	.72	.12	1674	.90	25.93	71.21
15-17	.24	.42	.36	1674	4.30	28.49	65.05
18-20	.72	.42	.18	1674	21.03	52.09	24.07
21-23	1.43	.48	.00	1674	38.35	42.65	12.25
00-23	1.46	.45	.10	13392	25.55	38.70	30.23

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TABLE 8.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 0 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.54	.36	.00	.00	.00	.00	.00	.90	37.99	1.25	.00	.00	.00	.00	5.20	44.44
5 TO 9	.00	.00	.00	.00	.00	.00	.00	.00	34.77	1.61	.72	.00	.00	.00	9.66	41.76
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.18	7.53	.18	.00	.18	.00	.18	8.24
TOTAL	.54	.36	.00	.00	.00	.00	.00	.90	72.94	10.39	.90	.00	.18	.00	10.04	94.44

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 1 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.25	.00	.00	.00	.00	.00	.00	1.25	36.56	2.51	.00	.00	.00	.00	6.09	45.16
5 TO 9	.00	.36	.00	.00	.00	.00	.00	.36	34.95	2.69	.36	.00	.00	.00	3.05	41.04
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.36	5.73	.36	.00	.18	.00	.00	6.63
TOTAL	1.25	.36	.00	.00	.00	.00	.00	1.61	71.86	10.93	.72	.00	.18	.00	9.14	92.83

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 2 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.51	.18	.00	.00	.00	.00	.00	2.69	39.78	1.97	.18	.00	.00	.00	6.63	48.57
5 TO 9	.00	.36	.00	.00	.00	.00	.00	.36	29.93	2.15	.18	.00	.00	.00	3.23	35.48
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.54	5.73	.36	.00	.18	.00	.18	6.99
TOTAL	2.51	.54	.00	.00	.00	.00	.00	3.05	70.25	9.86	.72	.00	.18	.00	10.04	91.04

TABLE 8.3. (Continued)

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 3 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	2.69	.00	.00	.00	.00	.00	.18	2.87 •	41.22	2.33	.00	.00	.00	.00	8.78	52.33
5 TO 9	.00	.00	.18	.00	.00	.00	.00	.18 •	27.79	1.08	.00	.00	.00	.00	3.05	31.90
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 •	.18	5.91	.18	.18	.00	.00	.18	6.63
TOTAL	2.69	.00	.18	.00	.00	.00	.18	3.05 •	69.18	9.32	.18	.18	.00	.00	12.01	90.86

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 4 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	3.23	.36	.00	.00	.00	.00	.00	3.58 •	41.58	2.15	.00	.00	.00	.00	6.27	50.00
5 TO 9	.00	.18	.00	.00	.00	.00	.00	.18 •	29.40	1.61	.54	.00	.00	.00	2.51	33.15
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 •	.18	4.30	.18	.00	.00	.00	.00	4.66
TOTAL	3.23	.54	.00	.00	.00	.00	.00	3.76 •	70.25	8.06	.72	.00	.00	.00	8.78	87.81

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 5 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	2.69	.36	.00	.00	.00	.00	.00	3.05 •	44.27	1.61	.00	.00	.00	.00	7.89	53.76
5 TO 9	.00	.18	.00	.00	.00	.00	.00	.18 •	25.27	.90	.18	.18	.00	.00	2.69	29.21
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 •	.00	6.66	.00	.18	.00	.00	.00	6.84
TOTAL	2.69	.54	.00	.00	.00	.00	.00	3.23 •	69.53	7.17	.18	.36	.00	.00	10.57	87.81

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TABLE 3.3. (Continued)

NSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 6 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.33	.18	.00	.00	.00	.00	.18	2.69	45.70	.90	.00	.00	.00	.00	9.68	56.27
5 TO 9	.00	.00	.36	.00	.00	.00	.00	.36	23.39	.90	.36	.00	.00	.00	2.33	26.88
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.00	5.02	.72	.36	.00	.00	.00	6.09
TOTAL	2.33	.18	.36	.00	.00	.00	.18	3.05	69.09	6.81	1.08	.36	.00	.00	12.01	89.25

NSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 7 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	4.12	.72	.00	.00	.00	.00	.00	4.84	29.57	1.25	.18	.18	.00	.00	5.73	36.92
5 TO 9	.00	.18	.00	.00	.00	.00	.00	.18	36.92	.90	.72	.00	.00	.00	2.33	40.86
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.54	9.14	1.25	.00	.00	.00	.18	11.11
TOTAL	4.12	.90	.00	.00	.00	.00	.00	5.02	67.03	11.29	2.15	.18	.00	.00	8.24	88.89

NSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 8 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.25	1.79	.00	.00	.00	.00	.00	3.05	14.34	3.23	.00	.18	.00	.00	1.08	18.82
5 TO 9	.00	.18	.18	.00	.00	.00	.00	.36	47.49	1.79	.72	.00	.00	.00	3.76	53.76
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	1.97	19.71	.54	.00	.00	.00	.54	22.76
TOTAL	1.25	1.97	.18	.00	.00	.00	.00	3.41	63.80	24.73	1.25	.18	.00	.00	5.38	95.34

TABLE 8.3. (Continued)

MSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 9 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• • 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.72	.72	.00	.00	.00	.00	.00	1.43 •	5.38	2.69	.18	.00	.00	.00	.00	8.24
5 TO 9	.00	.54	.00	.18	.00	.00	.00	.72 •	47.67	1.79	2.15	.00	.00	.00	2.87	54.48
10- UP	.00	.00	.36	.00	.00	.00	.00	.36 •	2.15	29.75	1.08	.18	.00	.00	.36	33.51
TOTAL	.72	1.25	.36	.18	.00	.00	.00	2.51 •	55.20	34.23	3.41	.18	.00	.00	3.23	96.24

MSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 10 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• • 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.36	.54	.00	.00	.00	.00	.00	.90 •	1.25	1.97	.18	.00	.00	.00	.00	3.41
5 TO 9	.00	.72	.36	.18	.00	.00	.00	1.25 •	46.77	2.15	1.08	.00	.00	.00	1.43	51.43
10- UP	.00	.00	.00	.18	.00	.00	.00	.18 •	1.43	37.63	1.97	.00	.00	.00	.18	41.22
TOTAL	.36	1.25	.36	.36	.00	.00	.00	2.33 •	49.46	41.76	3.23	.00	.00	.00	1.61	96.06

MSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 11 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• . TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• • 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.18	.18	.00	.00	.00	.00	.00	.36 •	.54	.90	.18	.00	.00	.00	.00	1.61
5 TO 9	.00	.00	.54	.00	.00	.00	.00	.54 •	36.20	2.87	1.26	.00	.00	.00	1.08	41.40
10- UP	.00	.00	.00	.00	.00	.00	.00	.90 •	1.61	50.18	2.33	.00	.00	.00	.90	55.02
TOTAL	.18	.18	.54	.00	.00	.00	.00	1.80 •	38.35	53.94	3.76	.00	.00	.00	1.97	98.03

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TABLE 8.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 12 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.18	.00	.00	.00	.00	.00	.18	.54	.18	.00	.00	.18	.00	.00	.90
5 TO 9	.00	.18	.36	.00	.00	.00	.00	.54	24.91	5.02	.90	.36	.00	.00	.36	31.54
10- UP	.00	.00	.18	.18	.00	.00	.00	.36	1.43	60.57	3.05	.00	.18	.00	.18	65.41
TOTAL	.00	.36	.54	.18	.00	.00	.00	1.08	26.88	65.77	3.94	.36	.36	.00	.54	97.85

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 13 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.54	.00	.00	.00	.00	.00	.00	.54
5 TO 9	.00	.18	.36	.00	.00	.00	.00	.54	20.07	3.58	.72	.36	.00	.00	.54	25.27
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.36	68.46	3.23	.18	.18	.00	.18	72.58
TOTAL	.00	.18	.36	.00	.00	.00	.00	.54	20.97	72.04	3.94	.54	.18	.00	.72	98.39

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 14 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.18	.00	.00	.00	.00	.00	.00	.18	.54	.36	.00	.18	.00	.00	.18	1.25
5 TO 9	.00	.72	.36	.00	.00	.00	.00	1.08	15.41	4.48	.18	.18	.00	.00	.72	20.97
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.54	67.56	6.99	.36	.00	.18	.00	75.63
TOTAL	.18	.72	.36	.00	.00	.00	.00	1.25	16.49	72.40	7.17	.72	.00	.18	.90	97.85

TABLE 8.3. (Continued)

[illegible] [illegible] [illegible] TAILWINDS VS CROSSWINDS
[illegible] OF U.S.

[illegible] 15 [illegible] 5/8

TAILWINDS LIMITS	RUNWAY 15 CROSSWIND LIMITS						ZERO CROSS	TOTAL
	1 TO 5	5 TO 10	10TO15	15TO20	20TO25	25- UP		
	PERCENTAGES							
1 TO 5	.00	.00	.00	.00	.00	.00	.00	.00
5 TO 10	.00	.00	.34	.18	.00	.00	.00	.50
10- UP	.00	.00	.36	.18	.00	.00	.00	.54
TOTAL	.00	.00	.72	.36	.00	.00	.00	1.08

TAILWINDS LIMITS	RUNWAY 33 CROSSWIND LIMITS						ZERO CROSS	TOTAL
	1 TO 5	5 TO 10	10TO15	15TO20	20TO25	25- UP		
	PERCENTAGES							
1 TO 5	1.26	.36	.36	.18	.00	.00	.18	2.33
5 TO 10	18.20	5.38	.54	.36	.00	.00	.54	25.09
10- UP	.72	42.27	4.09	.54	.36	.36	.90	73.03
TOTAL	20.20	48.10	4.99	1.08	.36	.36	.72	97.85

[illegible] [illegible] [illegible] TAILWINDS VS CROSSWINDS
[illegible] OF AUG.

[illegible] 16 [illegible] 5/8

TAILWINDS LIMITS	RUNWAY 16 CROSSWIND LIMITS						ZERO CROSS	TOTAL
	1 TO 5	5 TO 10	10TO15	15TO20	20TO25	25- UP		
	PERCENTAGES							
1 TO 5	.00	.18	.00	.00	.00	.00	.00	.18
5 TO 10	.00	.00	.36	.00	.00	.00	.00	.36
10- UP	.00	.00	.18	.00	.00	.00	.00	.18
TOTAL	.00	.18	.54	.18	.00	.00	.00	.72

TAILWINDS LIMITS	RUNWAY 34 CROSSWIND LIMITS						ZERO CROSS	TOTAL
	1 TO 5	5 TO 10	10TO15	15TO20	20TO25	25- UP		
	PERCENTAGES							
1 TO 5	2.05	.18	.54	.72	.00	.00	.54	5.02
5 TO 10	20.61	3.76	.18	.18	.00	.00	.36	25.09
10- UP	1.26	57.58	6.26	.36	.00	.36	.90	67.92
TOTAL	24.77	61.68	6.81	1.26	.00	.36	.90	98.03

[illegible] [illegible] [illegible] TAILWINDS VS CROSSWINDS
[illegible] OF AUG.

[illegible] 17 [illegible] 5/8

TAILWINDS LIMITS	RUNWAY 17 CROSSWIND LIMITS						ZERO CROSS	TOTAL
	1 TO 5	5 TO 10	10TO15	15TO20	20TO25	25- UP		
	PERCENTAGES							
1 TO 5	.36	.36	.00	.00	.00	.00	.18	5.56
5 TO 10	.00	.00	.36	.00	.00	.00	1.26	35.35
10- UP	.00	.00	.18	.00	.00	.00	.00	56.81
TOTAL	.36	.36	.54	.00	.00	.00	1.62	97.67

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TABLE 8.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 18 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.36	.18	.00	.00	.00	.00	.54	*	7.17	.72	.00	.36	.00	.00	.90	9.78
5 TO 9	.00	.18	.00	.00	.00	.00	.18	*	42.11	6.63	.36	.18	.00	.00	1.25	50.54
10- UP	.00	.00	.36	.00	.00	.00	.36	*	.72	35.66	1.25	.54	.00	.00	.18	38.35
TOTAL	.36	.36	.36	.00	.00	.00	1.08	*	50.00	43.01	1.61	.72	.00	.00	2.33	97.67

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 19 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.54	.18	.00	.00	.00	.00	.72	*	19.18	.72	.18	.00	.00	.00	1.79	21.86
5 TO 9	.00	.36	.18	.00	.00	.00	.54	*	49.29	6.30	.54	.18	.00	.00	1.97	58.27
10- UP	.00	.00	.00	.00	.00	.00	.00	*	.72	17.56	.54	.18	.00	.00	.00	19.00
TOTAL	.54	.54	.18	.00	.00	.00	1.25	*	69.19	22.58	1.25	.36	.00	.00	3.76	97.13

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

HOUR 20 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.54	.36	.00	.00	.00	.00	.90	*	29.93	.54	.00	.00	.00	.00	1.97	32.44
5 TO 9	.00	.54	.00	.00	.00	.00	.54	*	44.62	2.33	.54	.18	.00	.00	1.79	49.46
10- UP	.00	.00	.18	.00	.00	.00	.18	*	.72	13.08	.72	.18	.18	.00	.00	14.87
TOTAL	.54	.90	.18	.00	.00	.00	1.61	*	75.27	15.95	1.25	.36	.18	.00	3.76	96.77

TABLE 8.3. (Concluded)

[illegible] PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

[illegible] 21 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 5	5 TO 9	10TO15	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 5	5 TO 9	10TO15	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 5	.72	.72	.00	.00	.00	.00	.00	1.43	31.97	.72	.00	.00	.00	.00	3.58	35.30
5 TO 9	.00	.36	.00	.00	.00	.00	.00	.72	60.10	2.51	.36	.72	.00	.00	2.51	66.20
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	1.09	11.11	.36	.18	.00	.00	.18	12.90
TOTAL	.72	1.08	.00	.00	.00	.00	.00	1.79	72.27	14.34	.72	.90	.00	.00	6.27	94.40

[illegible] PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

[illegible] 22 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 5	5 TO 9	10TO15	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 5	5 TO 9	10TO15	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 5	1.26	.54	.00	.00	.18	.00	.00	1.61	33.15	.54	.00	.00	.00	.00	4.66	38.35
5 TO 9	.90	.18	.00	.00	.18	.00	.00	.18	37.06	3.79	.18	.54	.00	.00	1.97	43.90
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	1.09	10.75	.54	.00	.00	.18	.18	12.72
TOTAL	1.26	.72	.00	.00	.00	.00	.00	1.79	71.64	15.08	.72	.54	.00	.18	6.81	95.01

[illegible] PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF AUG.

[illegible] 23 — NUMBER OBS. 558

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 5	5 TO 9	10TO15	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 5	5 TO 9	10TO15	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 5	1.25	.72	.00	.00	.00	.00	.00	1.79	75.80	1.25	.00	.00	.00	.00	4.30	81.45
5 TO 9	.00	.72	.18	.00	.00	.00	.00	.90	34.27	1.97	.72	.00	.00	.00	2.87	39.78
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.18	9.66	.72	.36	.00	.00	.18	11.11
TOTAL	1.25	.72	.18	.00	.00	.00	.00	2.15	76.25	12.90	1.43	.36	.00	.00	7.35	92.29

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TABLE 4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS HEAD/TAIL WIND REVERSALS
MONTH OF AUG.

HRS	*** RUNWAY 15 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD	*** RUNWAY 33 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD
00-02	3.47	2.09	1.38	2.13	74.19	8.14	3.47	4.67	47.93	5.03
03-05	3.95	1.97	1.97	2.04	58.93	9.87	4.67	5.21	41.71	5.86
06-08	5.45	2.67	2.81	2.74	73.44	9.16	5.75	3.41	64.86	3.74
09-11	2.75	1.14	1.62	1.16	84.38	3.05	1.80	1.26	55.56	1.30
12-14	1.08	.54	.54	.54	56.25	1.20	.60	.60	30.30	.61
15-17	1.68	.84	.84	.85	92.35	1.97	.96	1.02	44.44	1.04
18-20	1.68	.96	.72	.97	54.55	3.23	1.08	2.15	38.30	2.22
21-23	2.09	.90	1.20	.92	62.50	7.54	3.77	3.77	55.75	4.04
00-23	2.77	1.38	1.38	1.41	68.52	5.52	2.76	2.76	49.93	2.92

8.4A

KSC PEAK WINDS HEADWIND TO TAILWIND REVERSALS
MONTH OF AUG.

HRS	*** RUNWAY 15 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL	*** RUNWAY 33 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL
00-02	1.83	.30	.00	2.13	34.71	11.57	1.65	47.93
03-05	1.86	.19	.00	2.04	32.62	9.09	.00	41.71
06-08	2.05	.56	.12	2.74	27.70	28.38	8.78	64.86
09-11	.31	.67	.18	1.16	.00	14.81	40.74	55.56
12-14	.00	.42	.12	.54	6.06	6.06	18.18	30.30
15-17	.12	.36	.36	.85	8.33	11.11	25.00	44.44
18-20	.61	.24	.12	.97	19.15	12.77	6.38	38.30
21-23	.49	.43	.00	.92	32.74	18.58	4.42	55.75
00-23	.90	.40	.11	1.41	26.39	15.43	8.12	49.93

8.4B

TABLE 6.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

USE MEAN WINDS — HEADWIND CUMULATIVE PERCENTAGE FREQUENCY (KNOTS OR MPH)

RUNWAY COMPONENT (KNOTS)	RUNWAY 15						RUNWAY 33				
	HOURS 0-3 CUM	HOURS 4-7 CUM	HOURS 8-10 CUM	HOURS 11-13 CUM	HOURS 14-17 CUM	HOURS 18-20 CUM	HOURS 21-23 CUM	HOURS 24-27 CUM	HOURS 28-30 CUM	HOURS 31-33 CUM	HOURS 34-37 CUM
1	7.58	2.15	1.84	1.34	2.89	56.78	88.70	91.52	97.78	93.51	
2	13.70	2.33	1.21	2.01	4.37	68.20	82.59	91.52	92.78	90.26	
3	19.81	2.62	1.33	2.96	6.59	85.81	95.80	90.55	91.54	78.85	
4	25.00	3.00	1.95	3.00	10.51	92.69	81.11	90.55	90.33	77.12	
5	30.20	5.85	1.92	5.05	14.13	96.62	88.52	87.58	87.89	81.92	
6	56.29	9.66	5.26	6.39	19.11	97.36	75.91	86.67	77.78	86.72	
7	64.01	16.62	9.22	12.55	23.16	99.32	78.65	75.76	82.56	93.06	
8	71.20	22.23	7.87	16.24	28.38	100.00	85.19	78.79	82.56	91.00	
9	76.36	36.69	11.36	19.21	34.25	100.00	92.59	87.88	93.33	94.83	
10	84.25	55.91	20.11	30.29	49.05	100.00	99.10	93.94	93.33	95.96	
11	91.66	68.66	45.51	47.13	62.27	100.00	98.15	93.94	88.89	97.02	
12	93.29	77.28	55.31	56.47	75.06	100.00	98.15	96.97	88.89	97.79	
13	95.28	86.45	69.66	69.29	79.53	100.00	98.15	96.97	96.66	98.52	
14	96.83	86.55	77.26	76.19	89.56	100.00	98.15	96.97	97.22	98.89	
15	97.65	92.05	83.66	82.99	89.19	100.00	98.15	96.97	97.22	98.89	
16	98.32	96.98	87.00	86.72	93.80	100.00	100.00	96.97	97.22	99.26	
17	98.65	96.65	91.68	89.76	96.16	100.00	100.00	96.97	97.22	99.26	
18	98.76	97.76	93.55	92.59	95.37	100.00	100.00	96.97	97.22	99.26	
19	99.21	98.25	95.79	96.21	96.76	100.00	100.00	96.97	97.22	99.26	
20	99.32	98.69	97.99	96.24	97.85	100.00	100.00	100.00	100.00	100.00	
21	99.66	98.92	97.77	96.85	98.19	100.00	100.00	100.00	100.00	100.00	
22	99.87	99.15	98.33	97.36	98.58	100.00	100.00	100.00	100.00	100.00	
23	99.83	99.33	98.89	97.59	98.75	100.00	100.00	100.00	100.00	100.00	
24	99.75	99.65	98.77	98.02	99.00	100.00	100.00	100.00	100.00	100.00	
25	99.75	99.57	98.93	98.91	99.28	100.00	100.00	100.00	100.00	100.00	
26	99.81	99.62	99.10	99.29	99.65	100.00	100.00	100.00	100.00	100.00	
27	99.81	99.92	99.29	99.14	99.59	100.00	100.00	100.00	100.00	100.00	
28	99.83	99.96	99.52	99.36	99.68	100.00	100.00	100.00	100.00	100.00	
29	99.83	99.96	99.52	99.36	99.85	100.00	100.00	100.00	100.00	100.00	
30	99.88	99.98	99.76	99.28	99.73	100.00	100.00	100.00	100.00	100.00	
31	99.98	100.00	99.82	99.85	99.79	100.00	100.00	100.00	100.00	100.00	
32	99.98	000000	99.82	99.57	99.82	100.00	100.00	100.00	100.00	100.00	
33	99.98	000000	99.82	99.64	99.85	100.00	100.00	100.00	100.00	100.00	
34	99.98	000000	99.98	99.79	99.88	100.00	100.00	100.00	100.00	100.00	
35	100.00	000000	99.98	99.78	99.91	100.00	100.00	100.00	100.00	100.00	
36	000000	000000	99.98	99.78	99.92	100.00	100.00	100.00	100.00	100.00	
37	000000	000000	100.00	99.82	99.95	100.00	100.00	100.00	100.00	100.00	
38	000000	000000	000000	99.89	99.97	100.00	100.00	100.00	100.00	100.00	
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231	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
232	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
233	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
234	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
235	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
236	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
237	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
238	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
239	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
240	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
241	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
242	000000	000000	000000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
243	000000	000000	000000	100.00	100.00	100.00	100.00

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TABLE 9.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF SEPT.

RUNWAY 15 - 33

	CROSSWIND ***** CRITICAL LIMITS IN KNOTS *****							
HR.	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	62.22	25.73	3.27	.94	.06	.23	7.54	1710
03-05	64.33	22.63	2.69	1.05	.06	.12	9.12	1710
06-08	59.42	26.48	3.33	.99	.12	.00	7.66	1710
09-11	37.84	53.92	5.56	1.52	.18	.06	.94	1710
12-14	19.65	70.06	7.13	1.81	.53	.23	.58	1710
15-17	26.26	64.68	6.20	1.75	.41	.23	.47	1710
18-20	55.09	35.56	5.56	1.05	.18	.35	2.22	1710
21-23	58.30	32.28	3.92	.82	.18	.29	4.21	1710
00-23	47.89	41.67	4.71	1.24	.21	.19	4.09	13680

TABLE 9.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF SEPT.

	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS				RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS		
HRS	1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	2.34	.64	.12	1710	27.78	40.23	25.50
03-05	2.57	.56	.00	1710	35.85	34.97	21.35
06-08	3.86	.88	.12	1710	29.47	35.96	26.08
09-11	.70	1.40	.47	1710	4.27	38.54	54.33
12-14	.06	.76	1.17	1710	1.75	21.93	73.92
15-17	.00	.47	1.11	1710	2.81	27.43	68.19
18-20	.94	1.17	.99	1710	14.04	45.96	36.32
21-23	1.87	1.05	.53	1710	23.22	40.58	31.58
00-23	1.54	.87	.56	13680	17.40	35.70	42.16

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TABLE 9.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 0 — NUMBER OBS. 570

TAIL-WIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.05	.88	.00	.00	.00	.00	.00	1.93 *	20.70	.88	.18	.00	.00	.00	3.16	24.91
5 TO 9	.00	.18	.35	.00	.00	.00	.00	.53 *	39.30	1.58	.53	.00	.00	.00	.88	42.28
10- UP	.00	.00	.00	.00	.00	.18	.00	.18 *	1.23	23.33	2.46	.70	.18	.00	.00	27.89
TOTAL	1.05	1.05	.35	.00	.00	.18	.00	2.63 *	61.23	25.79	3.16	.70	.18	.00	4.04	95.09

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 1 — NUMBER OBS. 570

TAIL-WIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.05	.88	.00	.00	.00	.00	.00	1.93 *	22.81	1.58	.00	.00	.00	.18	3.86	28.42
5 TO 9	.00	.70	.18	.00	.00	.00	.00	.88 *	36.49	1.40	.35	.00	.00	.00	1.23	39.47
10- UP	.00	.00	.00	.18	.00	.00	.00	.18 *	.70	20.70	2.63	1.05	.00	.18	.00	25.26
TOTAL	1.05	1.58	.18	.18	.00	.00	.00	2.98 *	60.00	23.68	2.98	1.05	.00	.35	5.09	93.16

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 2 — NUMBER OBS. 570

TAIL-WIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.11	1.05	.00	.00	.00	.00	.00	3.16 *	24.74	2.11	.35	.00	.00	.00	2.81	30.00
5 TO 9	.00	.35	.18	.00	.00	.00	.00	.53 *	35.96	2.28	.00	.18	.00	.00	.53	38.95
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	.53	19.30	2.63	.70	.00	.18	.00	23.33
TOTAL	2.11	1.40	.18	.00	.00	.00	.00	3.68 *	61.23	23.68	2.98	.88	.00	.18	3.33	92.28

TABLE 9.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 3 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.35	1.23	.00	.00	.00	.00	.00	1.58 *	25.96	2.11	.53	.00	.00	.00	3.33	31.93
5 TO 9	.00	.53	.18	.00	.00	.00	.00	.70 *	35.61	1.93	.00	.18	.00	.00	.70	38.42
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	.18	18.95	2.81	.88	.00	.18	.00	22.98
TOTAL	.35	1.75	.18	.00	.00	.00	.00	2.28 *	61.75	22.98	3.33	1.05	.00	.18	4.04	93.33

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 4 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.46	.35	.00	.00	.00	.00	.00	2.81 *	31.58	1.93	.35	.00	.00	.00	4.04	37.89
5 TO 9	.00	.35	.18	.00	.00	.00	.00	.53 *	31.93	1.23	.18	.00	.00	.00	.53	33.86
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	.70	18.25	.70	1.23	.00	.18	.00	21.05
TOTAL	2.46	.70	.18	.00	.00	.00	.00	3.33 *	64.21	21.40	1.23	1.23	.00	.18	4.56	92.81

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 5 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.98	.35	.00	.00	.00	.00	.00	3.33 *	31.05	2.28	.18	.00	.00	.00	4.21	37.72
5 TO 9	.00	.53	.00	.00	.00	.00	.00	.53 *	30.00	1.93	.35	.00	.00	.00	.35	32.63
10- UP	.00	.00	.00	.00	.00	.00	.00	.00 *	.18	15.96	2.63	.88	.18	.00	.18	20.00
TOTAL	2.98	.88	.00	.00	.00	.00	.00	3.86 *	61.23	20.18	3.16	.88	.18	.00	4.74	90.35

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TABLE 9.3. (Continued)

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 6 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	4.04	.70	.00	.70	.00	.00	.00	4.74	30.00	2.63	.35	.00	.00	.00	3.86	36.84
5 TO 9	.00	.18	.18	.00	.00	.00	.00	.35	30.35	1.58	.35	.00	.00	.00	.70	32.98
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.70	14.67	.88	.53	.18	.00	.00	16.95
TOTAL	4.04	.88	.18	.00	.00	.00	.00	5.09	61.05	20.88	1.58	.53	.18	.00	4.56	88.77

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 7 — NUMBER OBS. 570

TAIL-IND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.68	.88	.00	.00	.00	.00	.00	4.56	25.79	2.28	.70	.00	.00	.00	3.68	32.46
5 TO 9	.00	.35	.00	.00	.00	.00	.00	.35	32.46	1.23	.00	.00	.00	.00	.88	34.56
10- UP	.00	.00	.35	.00	.00	.00	.00	.35	.53	20.18	2.11	.88	.00	.00	.00	23.68
TOTAL	3.68	1.23	.35	.00	.00	.00	.00	5.26	58.77	23.68	2.81	.88	.00	.00	4.56	90.70

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 8 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.23	1.05	.00	.00	.00	.00	.00	2.28	11.58	4.39	1.05	.18	.00	.00	1.93	19.12
5 TO 9	.00	1.23	.70	.00	.00	.00	.00	1.93	37.37	1.05	.70	.18	.00	.00	1.05	40.35
10- UP	.00	.00	.00	.00	.00	.00	.00	.00	.53	31.05	2.63	1.23	.18	.00	.00	35.61
TOTAL	1.23	2.28	.70	.00	.00	.00	.00	4.21	49.47	36.49	4.39	1.58	.18	.00	2.98	95.09

TABLE 9.3. (Continued)

RSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 9 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 1* CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL *	RUNWAY 2* CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		*	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.35	1.23	.00	.00	.00	.00	.00	1.75 *	3.51	1.93	.70	.00	.18	.00	.00	6.32
5 TO 9	.00	.70	1.05	.35	.00	.00	.00	1.75 *	83.27	2.98	.70	.00	.00	.00	.00	85.79
10- 14	.00	.00	.70	.00	.00	.00	.00	.70 *	.70	39.47	2.11	1.05	.00	.00	.18	43.51
TOTAL	.35	1.58	1.75	.35	.00	.00	.00	4.21 *	85.44	44.39	3.51	1.05	.18	.00	1.05	95.61

RSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 10 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 1* CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL *	RUNWAY 2* CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		*	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.00	.18	.00	.00	.00	.00	.00	.18 *	1.93	2.11	.70	.00	.18	.00	.18	5.09
5 TO 9	.00	1.05	.18	.53	.00	.00	.00	1.75 *	54.39	2.46	1.05	.18	.00	.00	.35	58.42
10- 14	.00	.00	.18	.00	.00	.00	.00	.18 *	1.58	48.42	3.16	.70	.00	.00	.18	54.04
TOTAL	.00	1.23	.35	.53	.00	.00	.00	2.11 *	57.89	52.98	4.91	.88	.18	.00	.70	97.54

RSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 11 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 1* CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL *	RUNWAY 2* CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		*	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.00	.18	.00	.00	.00	.00	.00	.18 *	.53	.53	.35	.00	.00	.00	.00	1.40
5 TO 9	.00	.18	.18	.35	.00	.00	.00	.70 *	28.77	1.75	.35	.35	.00	.00	.18	31.40
10- 14	.00	.00	.18	.35	.00	.00	.00	.53 *	.35	58.95	5.09	.70	.18	.18	.00	65.80
TOTAL	.00	.35	.35	.70	.00	.00	.00	1.40 *	29.65	61.23	5.79	1.05	.18	.18	.18	98.25

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TABLE 9.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 12 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00
5 TO 9	.00	.18	.18	.35	.18	.00	.00	.88
10- UP	.00	.00	.88	.00	.18	.00	.00	1.05
TOTAL	.00	.18	1.05	.35	.35	.00	.00	1.93

TAILWIND LIMITS	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	.88	.53	.18	.00	.18	.18	.00	1.93
5 TO 9	20.35	2.98	.35	.53	.00	.00	.53	24.74
10- UP	.70	64.04	4.74	.70	.35	.18	.00	70.70
TOTAL	21.93	67.44	5.26	1.23	.53	.35	.53	97.37

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 13 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00
5 TO 9	.00	.18	.00	.18	.00	.00	.00	.35
10- UP	.00	.00	.70	.18	.00	.18	.00	1.05
TOTAL	.00	.18	.70	.35	.00	.18	.00	1.40

TAILWIND LIMITS	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	.70	.35	.18	.18	.00	.00	.00	1.40
5 TO 9	19.30	2.98	.70	.18	.00	.00	.00	23.16
10- UP	.53	66.32	5.61	.88	.18	.00	.00	73.51
TOTAL	20.53	69.65	6.49	1.23	.18	.00	.00	98.07

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 14 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	.00	.18	.00	.00	.00	.00	.00	.18
5 TO 9	.00	.00	.53	.53	.00	.00	.00	1.05
10- UP	.00	.00	.88	.18	.18	.18	.00	1.40
TOTAL	.00	.18	1.40	.70	.18	.18	.00	2.63

TAILWIND LIMITS	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	1.40	.35	.00	.18	.00	.00	.00	1.93
5 TO 9	14.21	2.81	.18	.53	.18	.00	.00	17.89
10- UP	.88	69.30	6.32	.88	.18	.00	.00	77.54
TOTAL	16.49	72.46	6.49	1.58	.35	.00	.00	97.37

TABLE 9.3. (Continued)

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 15 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00
5 TO 9	.00	.18	.35	.35	.00	.00	.00	.53
10- UP	.00	.00	.35	.35	.18	.00	.00	.70
TOTAL	.00	.18	.70	.53	.18	.00	.00	1.58

TAILWIND LIMITS	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	1.05	.35	.18	.18	.00	.18	.18	2.11
5 TO 9	17.02	2.28	.00	.35	.00	.00	.18	19.82
10- UP	.53	69.95	5.79	1.05	.18	.00	.00	76.09
TOTAL	18.69	71.58	5.96	1.58	.18	.18	.35	98.02

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 16 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00
5 TO 9	.00	.00	.00	.18	.00	.00	.00	.18
10- UP	.00	.00	.70	.18	.18	.35	.00	1.40
TOTAL	.00	.00	.70	.35	.18	.35	.00	1.58

TAILWIND LIMITS	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	1.05	.18	.00	.18	.00	.00	.35	1.40
5 TO 9	23.14	3.33	.53	.18	.00	.00	.35	27.54
10- UP	.35	67.63	5.26	1.05	.18	.00	.00	69.07
TOTAL	24.56	56.14	5.79	1.40	.18	.00	.35	98.02

ASC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 17 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00
5 TO 9	.00	.00	.00	.35	.00	.00	.00	.35
10- UP	.00	.00	.70	.18	.35	.00	.00	1.23
TOTAL	.00	.00	.70	.53	.35	.00	.00	1.58

TAILWIND LIMITS	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							
1 TO 4	3.37	.70	.53	.18	.00	.00	.18	4.91
5 TO 9	71.23	2.63	.53	.18	.00	.00	.35	30.91
10- UP	1.05	52.81	3.68	.53	.18	.18	.18	58.60
TOTAL	35.61	56.14	4.74	.88	.18	.18	.70	98.02

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TABLE 3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 18 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.18	.53	.00	.00	.00	.00	.00	.70 *	7.37	.88	.00	.00	.00	.18	.35	8.77
5 TO 9	.00	.53	.53	.00	.00	.00	.00	1.05 *	42.11	4.56	.35	.00	.00	.00	.70	47.72
10- UP	.00	.00	.88	.00	.00	.18	.00	1.05 *	.35	35.26	3.16	.88	.35	.00	.18	40.18
TOTAL	.18	1.05	1.40	.00	.00	.18	.00	2.81 *	49.82	40.70	3.51	.88	.35	.18	1.23	96.67

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 19 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.70	.18	.00	.00	.00	.00	.00	.88 *	11.40	1.23	.18	.00	.00	.18	1.05	14.04
5 TO 9	.00	.88	.35	.00	.00	.00	.00	1.23 *	44.04	2.28	.00	.00	.00	.00	.70	47.02
10- UP	.00	.00	.53	.00	.00	.18	.00	.70 *	.70	30.00	3.86	.70	.18	.00	.00	35.44
TOTAL	.70	1.05	.88	.00	.00	.18	.00	2.81 *	56.14	33.51	4.04	.70	.18	.18	1.75	96.49

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 20 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.70	.35	.00	.00	.00	.00	.18	1.23 *	17.54	.35	.18	.00	.00	.00	1.23	19.30
5 TO 9	.00	.53	.53	.18	.00	.00	.00	1.23 *	39.65	1.93	1.05	.18	.00	.00	.35	43.16
10- UP	.00	.00	.88	.18	.00	.18	.00	1.23 *	.53	27.19	4.21	1.05	.00	.18	.18	33.33
TOTAL	.70	.88	1.40	.35	.00	.18	.18	3.68 *	57.72	29.47	5.44	1.23	.00	.18	1.75	95.79

TABLE 9.3. (Concluded)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 21 — NUMBER OPS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15 TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.70	.70	.00	.00	.00	.00	.00	1.40 *	19.30	.70	.18	.18	.18	.00	1.75	22.28
5 TO 9	.00	.88	.35	.00	.00	.00	.00	1.23 *	38.42	2.98	.18	.00	.00	.00	.35	41.93
10- UP	.00	.00	.35	.18	.00	.18	.00	.70 *	.70	27.02	3.16	.70	.00	.00	.00	31.58
TOTAL	.70	1.58	.70	.18	.00	.18	.00	3.33 *	58.42	30.70	3.51	.88	.18	.00	2.11	95.79

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 22 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.70	.53	.00	.00	.00	.00	.00	1.23 *	19.30	.35	.35	.00	.00	.00	2.63	22.63
5 TO 9	.00	.53	.70	.00	.00	.00	.00	1.23 *	36.67	3.33	.00	.00	.00	.00	.35	40.35
10- UP	.00	.00	.18	.00	.00	.18	.00	.35 *	.70	28.42	3.16	.18	.18	.18	.18	32.98
TOTAL	.70	1.05	.88	.00	.00	.18	.00	2.81 *	56.67	32.11	3.51	.18	.18	.18	3.16	95.96

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF SEPT.

HOUR 23 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.93	1.05	.00	.00	.00	.00	.00	2.98 *	20.88	1.23	.18	.00	.18	.00	2.28	24.74
5 TO 9	.00	.35	.35	.00	.00	.00	.00	.70 *	35.09	2.46	.35	.18	.00	.00	1.40	39.47
10- UP	.00	.00	.18	.18	.00	.18	.00	.53 *	.53	26.32	2.11	.88	.00	.18	.18	30.18
TOTAL	1.93	1.40	.53	.18	.00	.18	.00	4.21 *	56.49	30.00	2.63	1.05	.18	.18	3.86	94.39

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TABLE 9.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — HEAD/TAIL WIND REVERSALS
MONTH OF SEPT.

HRS	*** RUNWAY 15 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD	*** RUNWAY 33 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD
00-02	3.87	1.87	1.99	1.93	64.15	6.80	3.10	3.69	47.75	5.95
03-05	3.98	2.46	1.52	2.54	48.15	8.67	3.57	5.10	45.52	5.53
06-08	6.62	3.16	3.46	3.33	71.08	10.13	6.21	3.93	73.10	4.29
09-11	2.75	1.00	1.76	1.02	68.18	3.05	1.82	1.23	63.27	1.27
12-14	2.11	1.00	1.11	1.02	55.88	2.46	1.41	1.05	58.54	1.08
15-17	1.79	1.05	.64	1.07	40.74	1.87	.64	1.23	40.74	1.25
18-20	2.64	1.41	1.23	1.45	39.62	3.22	1.46	1.76	39.68	1.82
21-23	3.40	1.58	1.82	1.64	52.54	5.33	2.58	2.75	55.70	2.89
00-23	3.38	1.69	1.69	1.74	56.76	5.19	2.60	2.59	54.70	2.72

9.4A

KSC PEAK WINDS — HEADWIND TO TAILWIND REVERSALS
MONTH OF SEPT.

HRS	*** RUNWAY 15 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL	*** RUNWAY 33 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL
00-02	1.27	.54	.12	1.93	27.03	16.22	4.50	47.75
03-05	1.94	.60	.00	2.54	30.60	11.94	2.99	45.52
06-08	1.64	1.36	.43	3.33	31.72	30.34	11.03	73.10
09-11	.56	.54	.42	1.02	8.16	10.20	44.90	63.27
12-14	.06	.48	.48	1.02	7.32	7.32	43.90	58.54
15-17	.18	.24	.65	1.07	14.81	3.70	22.22	40.74
18-20	.60	.54	.30	1.45	17.46	11.11	11.11	39.68
21-23	1.03	.42	.18	1.64	25.32	17.72	12.66	55.70
00-23	.83	.59	.32	1.74	24.50	16.64	13.56	54.70

9.4B

TABLE 9.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

NSC PEAK WINDS — HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF SEPT.

RUNWAY COMPONENT CLASS #####	HOURS 06-09 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	•	HOURS 06-09 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF
	••• RUNWAY 15 •••						••• RUNWAY 33 •••				
0- 1	8.11	1.50	.48	.12	2.51	•	44.83	10.20	17.07	.00	29.39
1- 2	11.68	2.10	.78	.59	3.73	•	53.10	10.20	17.07	.00	33.97
2- 3	16.53	2.46	1.13	1.01	5.20	•	73.79	12.24	19.51	.00	46.18
3- 4	26.12	3.30	1.67	1.99	8.12	•	84.14	18.37	19.51	.00	53.05
4- 5	34.79	4.68	2.21	2.85	10.96	•	88.28	34.69	19.51	.00	58.40
5- 6	43.09	8.70	2.98	4.69	14.66	•	91.72	51.02	24.39	.00	64.12
6- 7	50.53	13.09	4.06	7.25	18.37	•	93.10	55.10	29.27	7.41	67.18
7- 8	56.42	19.33	6.26	10.40	22.85	•	95.17	67.35	41.46	14.81	73.28
8- 9	62.88	27.19	9.96	15.98	28.74	•	96.55	75.51	43.90	25.93	77.10
9-10	72.59	44.24	24.58	30.72	42.80	•	98.62	83.67	51.22	29.63	81.30
10-11	77.75	54.74	36.97	43.32	52.99	•	99.31	85.71	56.10	37.04	83.59
11-12	81.38	62.12	46.72	52.82	60.60	•	99.31	87.76	56.10	51.85	85.50
12-13	85.49	71.67	59.67	64.47	70.29	•	100.00	91.84	75.61	66.67	91.22
13-14	87.95	77.37	67.35	71.00	75.81	•	******	93.88	82.93	74.07	93.51
14-15	89.98	82.17	74.29	77.18	80.83	•	******	95.92	92.68	81.48	96.18
15-16	92.19	85.71	78.70	81.34	84.43	•	******	97.96	92.68	92.59	97.71
16-17	94.22	88.84	82.52	85.20	87.64	•	******	97.96	97.56	92.59	98.47
17-18	95.14	90.88	86.69	88.41	90.24	•	******	100.00	97.56	92.59	98.85
18-19	96.13	94.18	91.16	91.21	92.89	•	******	******	97.56	92.59	98.85
19-20	96.74	95.98	93.91	95.01	95.40	•	******	******	97.56	92.59	98.85
20-21	97.39	96.40	95.35	95.90	96.23	•	******	******	97.56	92.59	98.85
21-22	97.60	97.36	96.24	96.73	96.98	•	******	******	97.56	92.59	98.85
22-23	97.91	97.60	96.60	97.27	97.34	•	******	******	100.00	96.30	99.62
23-24	98.16	97.84	97.07	97.74	97.68	•	******	******	******	96.30	99.62
24-25	98.46	98.14	97.14	97.92	97.91	•	******	******	******	100.00	100.00
25-26	98.52	98.32	97.32	98.16	98.08	•	******	******	******	******	******
26-27	98.65	98.50	97.85	98.28	98.22	•	******	******	******	******	******
27-28	98.71	98.50	98.03	98.34	98.39	•	******	******	******	******	******
28-29	98.71	98.56	98.15	98.51	98.48	•	******	******	******	******	******
29-30	98.71	98.80	98.57	98.99	98.77	•	******	******	******	******	******
30-31	98.96	98.98	98.75	99.17	98.96	•	******	******	******	******	******
31-32	98.96	99.10	99.11	99.17	99.08	•	******	******	******	******	******
32-33	99.08	99.34	99.27	99.29	99.23	•	******	******	******	******	******
33-34	99.14	99.34	99.34	99.41	99.31	•	******	******	******	******	******
34-35	99.32	99.46	99.40	99.47	99.41	•	******	******	******	******	******
35-36	99.45	99.58	99.46	99.52	99.50	•	******	******	******	******	******
36-37	99.57	99.64	99.59	99.70	99.62	•	******	******	******	******	******
37-38	99.63	99.70	99.59	99.76	99.67	•	******	******	******	******	******
38-39	99.69	99.76	99.70	99.82	99.74	•	******	******	******	******	******
39-40	99.75	99.82	99.76	99.82	99.79	•	******	******	******	******	******
40-41	99.75	99.82	99.76	99.82	99.79	•	******	******	******	******	******
41-42	99.82	99.94	99.76	99.82	99.83	•	******	******	******	******	******
42-43	99.88	99.94	99.76	99.82	99.85	•	******	******	******	******	******
43-44	99.94	99.94	99.82	99.82	99.88	•	******	******	******	******	******
44-45	99.94	99.94	99.82	99.82	99.88	•	******	******	******	******	******
45-46	100.00	100.00	99.82	99.88	99.92	•	******	******	******	******	******
46-47	******	******	99.88	99.94	99.95	•	******	******	******	******	******
47-48	******	******	99.88	99.94	99.95	•	******	******	******	******	******
48-49	******	******	99.88	99.94	99.95	•	******	******	******	******	******
49-50	******	******	99.94	100.00	99.98	•	******	******	******	******	******
50-51	******	******	100.00	******	100.00	•	******	******	******	******	******
NOBS	1627	1666	1676	1683	665	•	145	49	41	27	262

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TABLE 10.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF OCT.

RUNWAY 15 - 33

	CROSSWIND ***** CRITICAL LIMITS IN KNOTS *****							
HRS	1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	50.14	38.09	5.66	.85	.17	.00	5.09	1767
03-05	53.48	35.77	5.04	.91	.06	.00	4.75	1767
06-08	47.88	39.90	6.85	.96	.23	.00	4.19	1767
09-11	26.60	56.71	10.98	3.34	.68	.11	1.58	1767
12-14	18.51	65.08	11.15	3.06	.91	.45	.85	1767
15-17	28.35	58.18	9.90	1.64	.68	.45	.79	1767
18-20	46.41	41.03	8.66	.62	.40	.06	2.83	1767
21-23	47.93	39.62	7.75	.74	.23	.00	3.74	1767
00-23	39.91	46.80	8.25	1.51	.42	.19	2.98	14136

TABLE 10.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF OCT.

	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS				RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS		
HRS	1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	2.38	1.70	.40	1767	20.43	33.05	39.39
03-05	3.28	1.53	.34	1767	22.52	35.09	34.97
06-08	3.00	1.47	.34	1767	21.73	31.69	39.73
09-11	.79	3.96	1.70	1767	6.23	25.47	60.72
12-14	.11	2.83	2.83	1767	1.98	19.86	71.87
15-17	.45	1.58	2.43	1767	2.83	29.32	62.82
18-20	2.72	2.21	1.25	1767	16.58	32.03	43.92
21-23	3.34	2.21	.51	1767	18.73	30.96	42.33
00-23	2.01	2.19	1.22	14136	13.88	29.68	49.47

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TABLE 10.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 0 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.04	1.19	.00	.00	.00	.00	.00	3.23 *	16.13	1.36	.17	.00	.00	.00	1.36	19.02
5 TO 9	.00	1.36	.17	.17	.00	.00	.00	1.70 *	31.24	1.19	.00	.17	.00	.00	.51	33.11
10- UP	.00	.00	.51	.00	.00	.00	.00	.51 *	.68	33.96	5.43	.17	.00	.00	.00	40.24
TOTAL	2.04	2.55	.68	.17	.00	.00	.00	5.43 *	48.05	36.50	5.60	.34	.00	.00	1.87	92.36

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 1 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.68	.34	.00	.00	.00	.00	.00	1.02 *	16.98	2.38	.34	.34	.17	.00	1.36	21.56
5 TO 9	.00	1.36	.34	.34	.00	.00	.00	2.04 *	31.07	.68	.00	.00	.00	.00	.85	32.60
10- UP	.00	.00	.34	.00	.00	.00	.00	.34 *	.85	34.13	4.24	.17	.17	.00	.00	39.56
TOTAL	.68	1.70	.68	.34	.00	.00	.00	3.40 *	48.90	37.18	4.58	.51	.34	.00	2.21	93.72

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 2 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.04	.85	.00	.00	.00	.00	.00	2.89 *	15.28	2.04	.51	.51	.00	.00	2.38	20.71
5 TO 9	.00	.51	.51	.34	.00	.00	.00	1.36 *	32.26	.34	.17	.00	.00	.00	.68	33.45
10- UP	.00	.00	.17	.00	.17	.00	.00	.34 *	1.19	32.60	4.07	.34	.00	.00	.17	38.37
TOTAL	2.04	1.36	.68	.34	.17	.00	.00	4.58 *	48.73	34.97	4.75	.85	.00	.00	3.23	92.53

TABLE 10.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 3 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.38	.68	.00	.00	.00	.00	.00	3.06	16.99	2.38	.51	.34	.00	.00	2.04	22.24
5 TO 9	.00	1.19	.51	.68	.00	.00	.00	2.38	31.24	1.19	.00	.17	.00	.00	.85	33.45
10- UP	.00	.00	.34	.00	.00	.00	.00	.34	.85	31.24	3.23	.00	.00	.00	.17	35.48
TOTAL	2.38	1.87	.85	.68	.00	.00	.00	5.77	49.07	34.80	3.74	.51	.00	.00	3.06	91.17

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 4 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.72	1.02	.00	.00	.00	.00	.00	3.74	17.15	2.04	.51	.34	.00	.00	2.21	22.24
5 TO 9	.00	.34	.51	.34	.00	.00	.00	1.19	35.99	.68	.00	.00	.00	.00	.34	36.50
10- UP	.00	.00	.51	.00	.00	.00	.00	.51	.34	30.22	3.74	.17	.00	.00	.00	34.47
TOTAL	2.72	1.36	1.02	.34	.00	.00	.00	5.43	52.97	32.94	4.24	.51	.00	.00	2.55	93.21

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 5 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.04	1.02	.00	.00	.00	.00	.00	3.06	16.64	3.40	1.02	.34	.17	.00	1.53	23.09
5 TO 9	.00	.68	.17	.17	.00	.00	.00	1.02	33.96	.85	.17	.00	.00	.00	.34	35.31
10- UP	.00	.00	.00	.17	.00	.00	.00	.17	.68	30.39	3.90	.00	.00	.00	.00	34.97
TOTAL	2.04	1.70	.17	.34	.00	.00	.00	4.24	51.27	34.63	5.09	.34	.17	.00	1.87	93.38

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TABLE 10.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 6 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.21	1.19	.00	.00	.00	.00	.00	3.40	18.17	2.72	1.53	.17	.17	.00	2.38	25.13
5 TO 9	.00	.68	.17	.00	.00	.00	.00	.85	31.24	1.36	.34	.00	.00	.00	.17	33.11
10- UP	.00	.00	.00	.17	.00	.00	.00	.17	.68	29.03	4.92	.00	.00	.00	.00	34.63
TOTAL	2.21	1.87	.17	.17	.00	.00	.00	4.41	50.08	33.11	6.79	.17	.17	.00	2.55	92.87

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 7 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.19	1.02	.00	.00	.00	.00	.00	2.21	19.52	3.23	.68	.34	.00	.00	1.53	25.30
5 TO 9	.00	.34	.85	.68	.00	.00	.00	1.87	29.71	.17	.00	.17	.00	.00	.34	30.39
10- UP	.00	.00	.34	.00	.00	.00	.00	.34	.34	32.94	4.07	.00	.17	.00	.17	37.69
TOTAL	1.19	1.36	1.19	.68	.00	.00	.00	4.41	49.58	36.33	4.75	.51	.17	.00	2.04	93.38

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 8 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.53	1.87	.00	.00	.00	.00	.00	3.40	8.32	2.72	1.36	.85	.34	.00	1.19	14.77
5 TO 9	.00	.68	.68	.34	.00	.00	.00	1.70	30.85	.85	.00	.00	.00	.00	.68	31.58
10- UP	.00	.00	.51	.00	.00	.00	.00	.51	.68	40.92	5.09	.17	.00	.00	.00	46.86
TOTAL	1.53	2.55	1.19	.34	.00	.00	.00	5.60	39.85	44.48	6.45	1.02	.34	.00	1.87	93.21

TABLE 10.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 9 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.34	.85	.00	.00	.00	.00	.00	1.19	3.74	2.38	1.02	1.36	.00	.00	.17	8.66
5 TO 9	.00	1.02	1.36	1.19	.00	.00	.00	3.57	26.83	.34	.17	.34	.00	.00	.17	27.84
10- UP	.00	.17	.85	.17	.17	.17	.00	1.75	.68	40.92	6.96	.00	.00	.00	.00	56.54
TOTAL	.34	1.87	2.21	1.36	.17	.17	.00	6.11	31.24	51.61	8.15	1.70	.00	.00	.34	93.00

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 10 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.51	.68	.00	.00	.00	.00	.00	1.19	1.70	1.53	1.36	1.36	.00	.17	.00	6.11
5 TO 9	.00	1.36	1.87	1.02	.00	.00	.00	4.24	23.09	1.36	.34	.34	.00	.00	.51	25.64
10- UP	.00	.00	.68	.68	.17	.00	.00	1.53	.68	50.76	6.46	.00	.00	.00	.30	59.93
TOTAL	.51	2.04	2.55	1.70	.17	.00	.00	6.96	25.47	53.65	10.19	1.70	.00	.17	.51	91.68

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 11 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00	.68	1.53	.51	.68	.51	.00	.00	3.90
5 TO 9	.00	.68	1.36	1.70	.34	.00	.00	4.07	20.71	1.53	.00	.17	.00	.00	.51	22.92
10- UP	.00	.00	1.19	.51	.51	.00	.00	2.21	.85	57.22	6.79	.51	.34	.00	.00	65.70
TOTAL	.00	.68	2.55	2.21	.85	.00	.00	6.28	22.24	60.27	7.30	1.36	.85	.00	.51	92.53

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TABLE 10.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 12 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.17	.17	.00	.00	.00	.00	.00	.34 *	.68	.68	.85	.34	.51	.00	.00	3.06
5 TO 9	.00	1.19	.85	1.36	.00	.00	.00	3.40 *	17.32	1.02	.34	.17	.00	.00	.34	19.19
10- UP	.00	.00	1.19	1.53	.00	.34	.00	3.06 *	.68	59.42	9.34	.34	.17	.00	.17	70.12
TOTAL	.17	1.36	2.04	2.89	.00	.34	.00	6.79 *	18.68	61.12	10.53	.85	.68	.00	.51	92.36

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 13 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00 *	.00	.34	.17	.51	.17	.34	.00	1.53
5 TO 9	.00	.85	.85	1.53	.17	.00	.00	3.40 *	18.34	2.04	.17	.17	.17	.00	.34	21.22
10- UP	.00	.00	1.53	.85	.34	.17	.00	2.89 *	.68	61.12	8.32	.51	.00	.00	.00	70.63
TOTAL	.00	.85	2.38	2.38	.51	.17	.00	6.28 *	19.02	63.50	8.66	1.19	.34	.34	.34	93.38

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 14 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.00	.00	.00	.00	.00	.00	.00 *	.00	.51	.00	.34	.17	.17	.17	1.36
5 TO 9	.00	.68	.00	.85	.17	.00	.00	1.70 *	17.40	1.19	.34	.17	.00	.00	.00	19.19
10- UP	.00	.00	1.02	.34	.85	.34	.00	2.55 *	.17	66.04	8.49	.17	.00	.00	.00	74.87
TOTAL	.00	.68	1.02	1.19	1.02	.34	.00	4.24 *	17.66	67.74	8.83	.68	.17	.17	.17	95.42

TABLE 10.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 15 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.17	.00	.00	.00	.00	.00	.00	.17	.17	.51	.17	.34	.34	.17	.17	1.87
5 TO 9	.00	.34	.34	1.02	.00	.00	.00	1.70	20.54	2.21	.34	.00	.00	.00	.17	23.26
10- UP	.00	.00	1.02	.17	.51	.51	.00	2.21	.17	67.31	7.81	.00	.00	.00	.00	70.29
TOTAL	.17	.34	1.36	1.19	.51	.51	.00	4.07	20.88	69.03	8.32	.34	.34	.17	.34	95.42

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 16 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25+ UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.17	.34	.51	.00	.00	.00	.00	.51	.85	.34	.17	.17	.34	.00	.17	2.04
5 TO 9	.00	.34	.34	1.02	.00	.00	.00	1.70	24.49	2.21	.34	.17	.00	.00	.00	27.67
10- UP	.00	.00	.17	.85	.34	.17	.00	2.04	.85	55.86	8.66	.17	.00	.00	.00	65.53
TOTAL	.17	.68	1.02	1.87	.34	.17	.00	4.24	26.66	58.40	9.17	.51	.34	.00	.17	95.25

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 17 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.17	.51	.00	.00	.00	.00	.00	.68	2.89	1.19	.00	.17	.00	.17	.17	4.58
5 TO 9	.00	.34	.34	.68	.00	.00	.00	1.36	33.79	2.89	.34	.00	.00	.00	.00	37.01
10- UP	.00	.00	2.04	.17	.51	.34	.00	3.06	.34	45.16	7.13	.00	.00	.00	.00	52.63
TOTAL	.17	.85	2.38	.85	.51	.34	.00	5.09	37.01	49.24	7.47	.17	.00	.17	.17	94.23

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TABLE 10.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF OCT.

HOUR 18 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.04	.34	.00	.00	.00	.00	.00	2.38 *	12.73	1.19	.17	.17	.00		.68	14.94
5 TO 9	.00	1.36	.51	.34	.00	.00	.00	2.21 *	31.07	2.21	.51	.00	.00	.00	.00	33.79
10- UP	.00	.00	1.36	.34	.51	.00	.00	2.21 *	.34	36.33	6.45	.17	.00	.00	.00	43.29
TOTAL	2.04	1.70	1.87	.68	.51	.00	.00	6.79 *	44.14	39.73	7.13	.34	.00	.00	.68	92.02

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF OCT.

HOUR 19 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.72	.34	.00	.00	.00	.00	.00	3.06 *	14.77	.85	.17	.00	.00	.00	1.02	16.81
5 TO 9	.00	1.02	.17	.17	.34	.00	.00	1.70 *	29.07	1.36	.51	.00	.00	.00	1.02	31.92
10- UP	.00	.00	.85	.17	.17	.00	.00	1.19 *	.34	36.50	6.96	.00	.00	.17	.00	43.97
TOTAL	2.72	1.36	1.02	.34	.51	.00	.00	5.94 *	44.14	38.11	7.64	.00	.00	.17	2.04	92.70

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF OCT.

HOUR 20 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.87	.85	.00	.00	.00	.00	.00	2.72 *	15.62	.85	.34	.17	.00	.00	1.02	18.00
5 TO 9	.00	1.53	.85	.17	.17	.00	.00	2.72 *	29.35	1.19	.00	.00	.00	.00	.85	30.39
10- UP	.00	.00	.34	.00	.00	.00	.00	.34 *	.34	37.18	6.79	.17	.00	.00	.00	44.48
TOTAL	1.87	2.38	1.19	.17	.17	.00	.00	5.77 *	44.31	39.22	7.13	.34	.00	.00	1.87	92.87

TABLE 10.3. (Concluded)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 21 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	2.72	.85	.00	.00	.00	.00	.00	3.57 •	15.11	1.02	.17	.17	.17	.00	1.19	17.83
5 TO 9	.00	2.38	.68	.00	.00	.00	.00	3.06 •	28.86	1.70	.00	.17	.00	.00	.51	31.24
10- UP	.00	.00	.51	.34	.17	.00	.00	1.02 •	.34	34.30	6.79	.17	.00	.00	.00	41.60
TOTAL	2.72	3.23	1.19	.34	.17	.00	.00	7.64 •	44.31	37.01	6.96	.51	.17	.00	1.70	90.66

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 22 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	2.89	.68	.00	.00	.00	.00	.00	3.57 •	16.47	1.53	.34	.17	.17	.00	1.02	19.69
5 TO 9	.00	1.36	.34	.00	.00	.00	.00	1.70 •	29.29	.85	.00	.00	.17	.00	.17	30.39
10- UP	.00	.00	.17	.00	.00	.00	.00	.17 •	.17	34.81	6.79	.51	.00	.00	.17	42.11
TOTAL	2.89	2.04	.51	.00	.00	.00	.00	5.43 •	45.84	36.84	7.13	.68	.34	.00	1.36	92.19

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF OCT.

HOUR 23 — NUMBER OBS. 589

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	2.55	.34	.00	.00	.00	.00	.00	2.89 •	14.94	1.36	.51	.00	.00	.00	1.87	18.68
5 TO 9	.00	1.19	.51	.17	.00	.00	.00	1.87 •	29.37	1.36	.00	.00	.00	.00	.51	31.24
10- UP	.00	.00	.17	.17	.00	.00	.00	.34 •	1.19	35.48	6.28	.34	.00	.00	.00	43.29
TOTAL	2.55	1.53	.68	.34	.00	.00	.00	5.09 •	45.50	38.20	6.79	.34	.00	.00	2.38	93.21

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TABLE 10.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS HEAD/TAIL WIND REVERSALS
MONTH OF OCT.

HRS	*** RUNWAY 15 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD	*** RUNWAY 33 *** PERCENTAGE REVERSALS TOTAL	PERCENTAGE REVERSALS HEAD-TAIL	PERCENTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCENTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCENTAGE REVERSALS TO HEAD
00-02	4.42	2.27	2.15	2.37	48.10	6.41	3.00	3.40	42.06	3.66
03-05	4.65	2.18	2.55	2.21	49.45	6.24	3.40	2.83	45.80	3.06
06-08	7.14	3.85	3.29	4.05	68.24	8.96	4.54	4.42	66.12	4.75
09-11	8.39	4.31	4.08	4.61	63.16	9.13	4.42	4.71	58.65	5.09
12-14	5.67	2.38	3.29	2.53	56.86	5.90	3.46	2.44	54.95	2.60
15-17	5.05	2.95	2.10	3.09	46.84	5.27	2.10	3.17	41.57	3.34
18-20	6.18	3.27	2.95	3.44	49.06	6.92	3.23	3.68	44.19	3.98
21-23	6.78	2.55	3.23	2.71	53.77	7.88	4.20	3.68	52.86	4.00
00-23	5.91	2.95	2.95	3.12	54.72	7.09	3.54	3.54	51.02	3.81

10.4A

KSC PEAK WINDS HEADWIND TO TAILWIND REVERSALS
MONTH OF OCT.

HRS	*** RUNWAY 15 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL	*** RUNWAY 33 *** GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL
00-02	1.31	.65	.42	2.37	19.05	15.87	7.14	42.06
03-05	1.26	.72	.24	2.21	23.66	12.21	9.92	45.80
06-08	1.25	2.20	.60	4.05	20.66	21.49	23.97	66.12
09-11	.24	2.55	1.82	4.61	13.53	5.26	39.85	58.65
12-14	.06	.96	1.50	2.53	8.11	.90	45.95	54.95
15-17	.53	1.25	1.31	3.09	5.62	5.62	30.34	41.57
18-20	1.27	1.45	.72	3.44	17.05	9.30	17.83	44.19
21-23	1.45	.90	.36	2.71	20.00	18.57	14.29	52.86
00-23	.92	1.33	.87	3.12	16.53	11.53	22.96	51.02

10.4B

TABLE 10.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

~~---~~ ~~ASC PEAK WINDS~~ ~~---~~ HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF OCT.

RUNWAY COMPONENT CLASS (KNOTS)	HOURS 06-08	HOURS 09-11	HOURS 12-14	HOURS 15-17	HOURS 06-17	*	HOURS 06-08	HOURS 09-11	HOURS 12-14	HOURS 15-17	HOURS 06-17
	CPF	CPF	CPF	CPF	CPF	*	CPF	CPF	CPF	CPF	CPF
	*** RUNWAY 15 ***						*** RUNWAY 33 ***				
0- 1	6.12	2.42	1.08	.69	2.63	*	31.40	14.93	8.11	11.24	16.92
1- 2	9.57	4.84	1.92	1.48	4.46	*	39.67	14.93	8.11	13.48	19.56
2- 3	13.32	5.44	2.28	2.01	5.77	*	55.37	18.66	8.11	16.85	25.49
~~3- 4~~	~~10.62~~	~~6.65~~	~~2.46~~	~~2.73~~	~~7.95~~	*	~~61.90~~	~~28.15~~	~~8.11~~	~~19.10~~	~~28.13~~
4- 5	24.97	7.86	2.64	3.55	9.78	*	73.55	25.37	9.91	20.22	33.41
5- 6	32.10	9.68	3.36	5.81	12.77	*	82.64	37.31	13.51	25.84	41.32
6- 7	37.40	12.28	4.50	9.06	15.85	*	85.12	47.01	18.92	29.21	46.81
7- 8	42.45	16.58	6.61	14.04	19.96	*	88.43	56.72	24.32	37.08	53.41
8- 9	47.50	21.78	10.81	18.48	24.69	*	90.91	67.91	42.34	49.44	64.18
~~9-10~~	~~58.26~~	~~35.09~~	~~23.72~~	~~34.24~~	~~37.67~~	*	~~95.04~~	~~77.61~~	~~50.95~~	~~51.69~~	~~71.65~~
10-11	64.23	42.23	32.37	42.12	45.23	*	96.69	82.09	58.56	55.06	74.95
11-12	66.88	47.31	39.34	48.34	50.51	*	96.69	85.82	62.16	65.17	78.90
12-13	71.28	55.60	49.43	57.35	58.45	*	97.52	89.55	70.27	76.40	84.40
13-14	74.39	60.68	53.99	61.79	62.74	*	98.35	89.55	72.07	78.65	85.49
14-15	79.01	67.51	61.29	67.54	68.84	*	99.17	93.28	82.88	86.52	90.99
~~15-16~~	~~81.67~~	~~71.63~~	~~66.37~~	~~72.22~~	~~73.04~~	*	~~99.17~~	~~95.52~~	~~89.19~~	~~89.89~~	~~93.85~~
16-17	84.36	76.35	73.27	77.19	77.81	*	100.00	97.01	92.79	91.01	95.60
17-18	86.50	79.55	77.66	80.92	81.18	*	******	97.76	92.79	91.01	95.82
18-19	89.66	84.63	84.38	85.31	86.00	*	******	98.51	92.79	91.01	96.04
19-20	93.82	90.38	90.03	90.17	91.10	*	******	99.25	97.30	94.38	98.02
20-21	95.18	92.62	91.89	92.42	93.03	*	******	99.25	98.20	94.38	98.24
21-22	96.55	94.62	93.75	94.43	94.84	*	******	100.00	99.10	95.51	98.90
22-23	97.38	96.01	95.02	95.50	95.98	*	******	******	99.10	97.75	99.34
23-24	97.98	96.98	96.58	96.86	97.10	*	******	******	99.10	98.88	99.56
24-25	98.28	97.88	97.84	97.69	97.92	*	******	******	99.10	100.00	99.78
25-26	98.69	98.31	98.38	98.70	98.52	*	******	******	100.00	******	100.00
26-27	99.05	98.91	99.10	99.29	99.09	*	******	******	******	******	******
~~27-28~~	~~99.46~~	~~99.40~~	~~99.58~~	~~99.64~~	~~99.52~~	*	~~******~~	~~******~~	~~******~~	~~******~~	~~******~~
28-29	99.64	99.76	99.70	99.82	99.73	*	******	******	******	******	******
29-30	99.88	99.88	99.88	99.94	99.90	*	******	******	******	******	******
30-31	99.94	99.94	99.88	100.00	99.94	*	******	******	******	******	******
31-32	100.00	99.94	99.94	******	99.97	*	******	******	******	******	******
32-33	******	99.94	99.94	******	99.97	*	******	******	******	******	******
~~33-34~~	~~******~~	~~100.00~~	~~99.94~~	~~******~~	~~99.99~~	*	~~******~~	~~******~~	~~******~~	~~******~~	~~******~~
34-35	******	******	100.00	******	100.00	*	******	******	******	******	******
NOBS	1662	1653	1665	1688	6688	*	121	134	111	89	455

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TABLE 11.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF NOV.

RUNWAY 15 - 33

HRS	CROSSWIND ***** CRITICAL LIMITS IN KNOTS ***** 1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	50.29	33.57	5.61	2.87	.88	.06	6.73	1710
03-05	51.29	33.04	5.26	3.16	.64	.23	6.37	1710
06-08	47.60	36.37	5.44	2.87	.88	.18	6.67	1710
09-11	27.85	51.61	10.88	4.10	1.40	.41	3.74	1709
12-14	21.11	59.88	8.60	4.56	1.52	.76	3.57	1710
15-17	37.89	47.84	6.20	3.33	.94	.64	3.16	1710
18-20	57.08	29.18	4.33	2.22	.70	.23	6.26	1710
21-23	52.11	32.40	4.80	1.58	.94	.12	8.07	1710
00-23	43.15	40.49	6.39	3.09	.99	.33	5.57	13679

TABLE 11.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF NOV.

HRS	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	3.80	2.05	1.81	1710	23.68	33.33	30.23
03-05	4.44	2.34	1.93	1710	26.73	31.99	28.19
06-08	4.91	2.92	1.29	1710	26.61	30.18	29.42
09-11	1.58	5.32	2.93	1709	9.77	25.10	51.96
12-14	.41	2.63	4.56	1710	3.74	22.34	63.39
15-17	.88	3.80	3.80	1710	6.55	35.32	46.78
18-20	4.50	3.92	2.63	1710	26.08	33.10	25.73
21-23	3.74	3.16	1.40	1710	23.45	33.74	30.06
00-23	3.03	3.27	2.54	13679	18.33	30.64	38.22

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TABLE 11.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 0 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES							
1 TO 4	2.81	.88	.00	.00	.00	.00	3.68	*	16.84	2.63	1.05	.53	.35	.18	1.05	22.63
5 TO 9	.00	.35	.35	1.40	.00	.00	.88	2.11	*	29.82	1.58	.18	.18	.00	.00	.70	32.46
10- UP	.00	.00	1.05	.18	.53	.00	.00	1.75	*	1.05	28.60	2.28	.00	.00	.00	.18	32.11
TOTAL	2.81	1.23	1.40	1.58	.53	.00	.00	7.54	*	47.72	32.81	3.51	.70	.35	.18	1.93	87.19

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 1 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES							
1 TO 4	1.93	1.75	.00	.00	.00	.00	.00	3.68	*	16.49	4.74	1.23	.53	.35	.00	1.23	24.56
5 TO 9	.00	.18	.53	1.40	.18	.00	.00	2.28	*	29.65	2.11	.53	.35	.00	.00	.53	33.16
10- UP	.00	.00	.70	.53	.18	.00	.00	1.40	*	.70	26.49	2.46	.00	.18	.00	.18	30.00
TOTAL	1.93	1.93	1.23	1.93	.35	.00	.00	7.37	*	46.84	33.33	4.21	.88	.53	.00	1.93	87.72

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 2 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	*	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								*	PERCENTAGES							
1 TO 4	2.63	1.40	.00	.00	.00	.00	.00	4.04	*	16.32	3.51	1.58	1.23	.70	.00	.53	23.86
5 TO 9	.00	.35	.70	.70	.00	.00	.00	1.75	*	32.11	1.23	.18	.35	.18	.00	.35	34.39
10- UP	.00	.00	1.05	1.23	.00	.00	.00	2.28	*	.53	24.91	2.98	.00	.00	.00	.18	28.60
TOTAL	2.63	1.75	1.75	1.93	.00	.00	.00	8.07	*	48.95	29.65	4.74	1.58	.88	.00	1.05	86.84

TABLE 11.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 3 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 PERCENTAGES: 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 PERCENTAGES: 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
1 TO 4	2.28	2.28	.00	.00	.00	.00	.00	4.56	17.02	3.51	1.40	1.05	.35	.53	1.93	25.79
5 TO 9	.00	.70	.88	1.05	.00	.00	.00	2.63	31.75	.88	.53	.35	.00	.00	.88	34.39
10- UP	.00	.00	.70	.53	.18	.00	.00	1.40	.35	23.86	2.28	.18	.00	.00	.00	26.67
TOTAL	2.28	2.98	1.58	1.58	.18	.00	.00	8.60	49.12	28.25	4.21	1.58	.35	.53	2.81	86.84

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 4 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 PERCENTAGES: 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 PERCENTAGES: 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
1 TO 4	1.75	1.93	.00	.00	.00	.00	.00	3.68	19.65	4.21	1.75	.88	.70	.00	1.05	28.25
5 TO 9	.00	.70	.88	.88	.00	.00	.00	2.46	28.95	.70	.35	.18	.00	.00	.53	30.70
10- UP	.00	.00	.70	1.05	.18	.00	.00	1.93	.70	26.67	1.40	.00	.00	.00	.00	28.77
TOTAL	1.75	2.63	1.58	1.93	.18	.00	.00	8.07	49.30	31.58	3.51	1.05	.70	.00	1.58	87.72

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 5 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 PERCENTAGES: 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 PERCENTAGES: 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
1 TO 4	2.11	2.98	.00	.00	.00	.00	.00	5.09	16.95	2.81	1.23	1.58	.18	.18	1.23	26.14
5 TO 9	.00	.70	.35	.70	.18	.00	.00	1.93	29.82	.53	.00	.18	.00	.00	.35	30.88
10- UP	.00	.00	1.40	.88	.18	.00	.00	2.46	.53	26.67	1.93	.00	.00	.00	.00	29.12
TOTAL	2.11	3.68	1.75	1.58	.35	.00	.00	9.47	49.30	30.00	3.16	1.75	.18	.18	1.58	86.14

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TABLE 11.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 6 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.98	2.11	.00	.00	.00	.00	.00	5.09 *	18.42	4.39	1.05	1.23	.53	.18	1.75	27.54
5 TO 9	.00	.88	.88	.35	.18	.00	.00	2.28 *	30.70	1.05	.00	.18	.00	.00	.35	32.28
10- UP	.00	.00	.35	.53	.35	.00	.00	1.23 *	.18	24.74	2.28	.00	.00	.00	.00	27.19
TOTAL	2.98	2.98	1.23	.88	.53	.00	.00	8.60 *	49.30	30.18	3.33	1.40	.53	.18	2.11	87.02

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 7 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.11	2.46	.00	.00	.00	.00	.00	4.56 *	19.30	4.74	2.28	1.40	.53	.00	1.75	30.00
5 TO 9	.00	1.23	.53	.70	.00	.00	.00	2.46 *	29.82	.53	.18	.18	.00	.00	.18	30.88
10- UP	.00	.00	.35	.70	.00	.18	.00	1.23 *	.35	23.68	2.28	.00	.00	.00	.00	26.32
TOTAL	2.11	3.68	.88	1.40	.00	.18	.00	8.25 *	49.47	28.95	4.74	1.58	.53	.00	1.93	87.19

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 8 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.28	2.81	.00	.00	.00	.00	.00	5.09 *	11.75	4.56	1.75	1.75	.70	.18	1.58	22.28
5 TO 9	.00	1.58	1.40	1.05	.00	.00	.00	4.04 *	24.21	2.28	.53	.00	.18	.00	.18	27.37
10- UP	.00	.00	.70	.53	.18	.00	.00	1.40 *	.70	32.11	1.75	.00	.00	.00	.18	34.74
TOTAL	2.28	4.39	2.11	1.58	.18	.00	.00	10.53 *	36.67	38.95	4.04	1.75	.88	.18	1.93	84.39

TABLE 11.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 9 — NUMBER OBS. 573

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	.88	1.93	.00	.70	.00	.00	.00	2.91 •	5.61	2.63	2.81	1.93	1.05	.35	.70	15.09
5 TO 9	.00	2.28	1.75	1.23	.00	.00	.00	5.26 •	26.32	.88	.35	.35	.00	.00	.18	28.07
10- UP	.00	.00	.88	.70	.35	.00	.00	1.93 •	.88	39.65	3.51	.00	.00	.00	.00	44.04
TOTAL	.88	4.21	2.63	1.93	.35	.70	.00	9.30 •	32.81	43.16	6.67	2.28	1.05	.35	.88	87.19

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 10 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	.18	1.05	.00	.00	.00	.00	.00	1.23 •	3.16	1.58	1.93	1.05	.70	.18	.00	8.60
5 TO 9	.00	1.23	2.28	1.58	.00	.00	.00	5.09 •	21.93	.70	.88	.70	.18	.00	.00	24.39
10- UP	.00	.00	1.75	1.40	.35	.18	.00	3.68 •	1.40	47.37	4.56	.00	.00	.00	.18	53.51
TOTAL	.18	2.28	4.04	2.98	.35	.18	.00	10.00 •	26.49	49.65	7.37	1.75	.88	.18	.18	86.49

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 11 — NUMBER OBS. 569

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							•	PERCENTAGES							
1 TO 4	.35	.35	.00	.00	.00	.00	.00	.70 •	1.23	.88	1.58	.53	.88	.53	.00	5.62
5 TO 9	.00	1.76	1.76	1.76	.35	.00	.00	5.62 •	20.21	1.05	1.05	.35	.00	.00	.18	22.85
10- UP	.00	.00	2.11	1.41	.35	.70	.00	3.87 •	1.41	51.49	5.45	.00	.00	.00	.00	58.35
TOTAL	.35	2.11	3.87	3.16	.70	.00	.00	10.19 •	22.85	53.43	8.08	.88	.88	.53	.18	86.82

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TABLE 11.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 12 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.35	.00	.00	.00	.00	.00	.35 *	1.05	1.23	.70	1.93	.18	.35	.00	5.44
5 TO 9	.00	.35	.53	.88	.18	.00	.00	1.93 *	19.82	.35	.53	.00	.18	.00	.35	21.23
10- UP	.00	.00	2.11	1.40	.70	.35	.00	4.56 *	1.23	55.79	6.14	.18	.00	.00	.18	63.51
TOTAL	.00	.70	2.63	2.28	.88	.35	.00	6.84 *	22.11	57.37	7.37	2.11	.35	.35	.53	90.18

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 13 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.18	.35	.00	.00	.00	.00	.00	.53 *	.35	1.05	.53	.35	.53	.35	.00	3.16
5 TO 9	.00	.35	.70	1.75	.00	.00	.00	2.81 *	19.30	1.40	.18	.35	.00	.00	1.23	22.46
10- UP	.00	.00	1.58	1.93	.88	.53	.00	4.91 *	.35	56.32	6.14	.18	.18	.00	.00	63.16
TOTAL	.18	.70	2.28	3.68	.88	.53	.00	8.25 *	20.00	58.77	6.84	.88	.70	.35	1.23	88.77

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 14 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.35	.00	.00	.00	.00	.00	.35 *	.18	.35	.88	.35	.53	.35	.00	2.63
5 TO 9	.00	.70	.35	1.58	.53	.00	.00	3.16 *	20.53	1.93	.18	.53	.00	.00	.18	23.33
10- UP	.00	.00	1.23	1.93	.70	.35	.00	4.21 *	.35	58.77	4.04	.35	.00	.00	.00	63.51
TOTAL	.00	1.05	1.58	3.51	1.23	.35	.00	7.72 *	21.05	61.05	5.09	1.23	.53	.35	.18	89.47

TABLE 11.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 15 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.35	.00	.00	.00	.00	.00	.35 •	.18	.00	.70	.35	.70	.35	.18	2.46
5 TO 9	.00	1.23	.70	1.05	.00	.00	.00	2.98 •	26.67	2.11	.53	.35	.00	.00	.00	29.65
10- UP	.00	.00	1.75	.88	.70	.35	.00	3.68 •	.53	52.81	4.74	.00	.00	.00	.00	58.07
TOTAL	.00	1.58	2.46	1.93	.70	.35	.00	7.02 •	27.37	54.91	5.96	.70	.70	.35	.18	90.18

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 16 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.70	.00	.00	.00	.00	.00	.70 •	1.23	.53	.53	.18	.18	.35	.00	2.98
5 TO 9	.00	1.40	.84	1.40	.35	.00	.00	4.21 •	34.21	2.46	.18	.18	.00	.00	.00	37.02
10- UP	.00	.00	2.28	1.75	.00	.53	.00	4.56 •	.00	48.56	2.63	.35	.00	.00	.00	47.54
TOTAL	.00	2.11	3.16	3.33	.35	.53	.00	9.47 •	35.44	87.54	3.33	.70	.18	.35	.00	87.54

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 17 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO20	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.88	.70	.00	.00	.00	.00	.00	1.58 •	12.28	.70	.00	.18	.35	.18	.53	14.21
5 TO 9	.00	1.75	.88	1.58	.00	.00	.00	4.21 •	37.37	1.58	.18	.00	.00	.00	.18	39.30
10- UP	.00	.00	1.40	1.23	.53	.00	.00	3.16 •	.35	32.63	1.23	.35	.00	.18	.00	34.74
TOTAL	.88	2.46	2.28	2.81	.53	.00	.00	8.95 •	50.00	34.91	1.40	.53	.35	.35	.70	88.25

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TABLE 11.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 18 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.75	1.40	.00	.00	.00	.00	.00	3.16	21.93	1.23	.18	.18	.18	.00	2.81	26.49
5 TO 9	.00	1.75	1.05	.88	.18	.00	.00	3.86	32.99	1.23	.18	.00	.00	.00	.00	34.39
10- UP	.00	.00	1.58	1.05	.53	.35	.00	3.51	.00	22.46	1.75	.18	.00	.00	.00	24.39
TOTAL	1.75	3.16	2.63	1.93	.70	.35	.00	10.53	54.91	24.91	2.11	.35	.18	.00	2.81	85.26

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 19 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.68	1.40	.00	.00	.00	.00	.00	5.09	22.28	1.05	.53	.35	.00	.00	1.93	26.14
5 TO 9	.00	1.75	1.23	1.40	.00	.00	.00	4.39	32.28	.53	.00	.00	.00	.00	.18	32.98
10- UP	.00	.00	.88	.70	.53	.18	.00	2.28	.18	24.04	1.23	.00	.00	.00	.00	25.44
TOTAL	3.68	3.16	2.11	2.11	.53	.18	.00	11.75	54.74	25.61	1.75	.35	.00	.00	2.11	84.56

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 20 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.68	1.58	.00	.00	.00	.00	.00	5.26	21.05	2.28	.70	.18	.35	.00	1.05	25.61
5 TO 9	.00	1.40	1.23	.88	.00	.00	.00	3.51	30.00	.53	.00	.00	.00	.00	.53	31.93
10- UP	.00	.00	1.05	.53	.35	.18	.00	2.11	.53	24.91	1.40	.35	.00	.00	.18	27.37
TOTAL	3.68	2.98	2.28	1.40	.35	.18	.00	10.88	52.46	27.72	2.11	.53	.35	.00	1.75	84.91

TABLE 11.3. (Concluded)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 21 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.33	.53	.00	.00	.00	.00	.18	4.04	18.07	2.81	1.05	.35	.35	.18	2.28	25.09
5 TO 9	.00	2.63	.70	.70	.18	.00	.00	4.21	31.58	1.05	.18	.18	.00	.00	.70	33.68
10- UP	.00	.00	.88	.00	.35	.00	.00	1.23	.35	26.14	1.40	.00	.00	.00	.00	27.89
TOTAL	3.33	3.16	1.58	.70	.53	.00	.18	9.47	50.00	30.00	2.63	.53	.35	.18	2.98	86.67

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 22 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.16	.70	.00	.00	.00	.00	.00	3.86	15.79	1.75	1.05	.70	.18	.18	3.33	22.98
5 TO 9	.00	1.40	1.23	.18	.00	.00	.00	2.81	30.59	.88	.00	.00	.00	.00	1.23	32.63
10- UP	.00	.00	.70	.35	.18	.00	.00	1.23	.88	29.30	1.58	.18	.18	.00	.18	32.28
TOTAL	3.16	2.11	1.93	.53	.18	.00	.00	7.89	47.19	31.93	2.63	.88	.35	.18	4.74	87.89

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF NOV.

HOUR 23 — NUMBER OBS. 570

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.28	1.05	.00	.00	.00	.00	.00	3.33	15.26	1.58	1.23	.88	.88	.00	2.46	22.28
5 TO 9	.00	.53	1.23	.70	.00	.00	.00	2.46	33.51	.35	.35	.00	.18	.00	.53	34.91
10- UP	.00	.00	.88	.53	.35	.00	.00	1.75	1.58	26.49	1.93	.00	.00	.00	.00	30.00
TOTAL	2.28	1.58	2.11	1.23	.35	.00	.00	7.54	50.35	28.42	3.51	.88	1.05	.00	2.98	87.19

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TABLE 11.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — HEAD/TAIL WIND REVERSALS
MONTH OF NOV.

	*** RUNWAY 15 ***					*** RUNWAY 33 ***				
MPS	PERCNTAGE REVERSALS TOTAL	PERCNTAGE REVERSALS HEAD-TAIL	PERCNTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCNTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCNTAGE REVERSALS TO HEAD	PERCNTAGE REVERSALS TOTAL	PERCNTAGE REVERSALS HEAD-TAIL	PERCNTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCNTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCNTAGE REVERSALS TO HEAD
00-02	5.96	3.10	2.75	3.36	35.88	7.73	3.81	3.93	29.82	4.50
03-06	7.60	3.75	3.76	4.11	42.05	9.20	4.63	4.57	35.27	5.26
06-09	10.31	5.27	5.04	5.80	55.13	12.13	6.09	6.03	44.07	7.00
09-12	11.60	5.39	6.21	5.98	63.10	11.66	6.33	5.33	48.00	6.14
12-14	8.03	4.04	3.98	4.38	52.31	8.08	4.04	4.04	38.33	4.52
15-17	7.73	4.45	3.28	4.87	38.62	8.32	3.34	4.98	29.38	5.62
18-20	9.14	4.39	4.75	4.94	42.86	10.66	5.57	5.10	36.82	6.00
21-23	7.09	3.22	3.87	3.51	46.48	9.98	5.09	4.86	39.45	5.57
00-23	8.41	4.20	4.20	4.61	47.44	9.71	4.86	4.86	37.82	5.57

11.4A

KSC PEAK WINDS — HEADWIND TO TAILWIND REVERSALS
MONTH OF NOV.

	*** RUNWAY 15 ***				*** RUNWAY 33 ***			
	GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE				GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE			
MPS	>0 - 3	4 - 8	> 8	TOTAL	>0 - 3	4 - 8	> 8	TOTAL
00-02	1.71	1.27	.38	3.36	16.97	7.80	5.05	29.82
03-05	2.31	.96	.83	4.11	18.30	7.59	9.38	35.27
06-08	2.39	2.64	.77	5.80	19.07	11.44	13.56	44.07
09-11	.39	2.47	3.12	5.98	9.78	4.44	33.78	48.00
12-14	.25	1.65	2.47	4.38	6.67	.56	31.11	38.33
15-17	1.09	2.18	1.60	4.87	4.64	6.70	18.04	29.38
18-20	2.50	1.45	.99	4.94	15.12	10.85	10.85	36.22
21-23	1.47	1.09	.96	3.51	20.64	9.17	9.63	39.45
00-23	1.91	1.71	1.39	4.81	14.26	7.59	15.97	37.82

11.4B

TABLE 11.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

ASC PEAK WINDS — HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF NOV.

RUNWAY COMPONENT	••• RUNWAY 15 •••						••• RUNWAY 33 •••				
CLASS	HOURS 06-09	HOURS 09-12	HOURS 12-15	HOURS 15-18	HOURS 06-18	•	HOURS 06-09	HOURS 09-12	HOURS 12-15	HOURS 15-18	HOURS 06-18
	CPF	CPF	CPF	CPF	CPF	•	CPF	CPF	CPF	CPF	CPF
0- 1	12.10	5.39	3.35	3.45	6.06	•	34.32	25.33	27.78	25.26	28.38
1- 2	16.92	9.28	5.38	4.54	9.01	•	39.41	25.78	27.78	25.77	30.06
2- 3	20.79	10.71	5.89	6.01	10.82	•	53.81	28.44	29.44	26.29	35.33
3- 4	28.34	12.65	6.46	8.05	15.90	•	63.14	32.44	30.00	28.87	39.76
4- 5	34.43	18.54	7.22	10.29	16.57	•	69.49	37.33	31.67	32.99	44.19
5- 6	43.24	18.36	8.86	15.97	24.45	•	76.27	46.22	33.33	38.66	50.18
6- 7	48.84	21.87	10.70	21.24	25.61	•	79.66	53.78	37.22	42.78	54.97
7- 8	53.86	27.19	13.92	27.54	30.56	•	84.75	60.00	41.67	50.52	60.84
8- 9	59.69	32.19	18.10	34.57	35.32	•	87.29	66.67	50.00	60.31	67.43
9-10	67.65	42.94	31.39	48.89	47.52	•	90.68	77.78	56.67	66.49	74.25
10-11	72.59	48.35	39.05	56.36	54.04	•	92.80	81.78	63.89	71.65	78.68
11-12	75.68	54.19	46.65	62.30	59.66	•	93.64	83.56	67.22	74.23	80.72
12-13	80.31	62.23	55.44	70.29	67.04	•	94.07	86.67	76.11	81.96	85.39
13-14	83.01	66.97	61.65	75.59	71.78	•	94.49	88.00	77.78	85.05	86.95
14-15	86.42	72.62	69.30	80.19	77.12	•	95.34	91.56	82.22	88.66	89.94
15-16	89.24	77.87	75.82	84.24	81.79	•	96.61	94.22	88.89	91.24	93.05
16-17	90.93	82.67	80.76	87.48	85.45	•	97.88	96.89	93.33	96.39	96.29
17-18	92.73	86.24	84.87	89.78	88.40	•	98.31	98.22	93.89	97.42	97.13
18-19	94.79	89.88	89.43	92.84	91.73	•	98.73	98.67	96.11	98.97	98.20
19-20	97.23	94.74	94.30	95.97	95.56	•	99.58	98.67	98.89	100.00	99.28
20-21	97.81	95.98	95.32	97.06	96.54	•	100.00	99.11	99.44	••••••	99.64
21-22	98.65	97.40	96.52	98.08	97.66	•	••••••	100.00	100.00	••••••	100.00
22-23	98.91	98.12	97.34	98.47	98.21	•	••••••	••••••	••••••	••••••	••••••
23-24	99.23	98.74	98.48	99.17	98.88	•	••••••	••••••	••••••	••••••	••••••
24-25	99.49	98.96	98.86	99.23	99.13	•	••••••	••••••	••••••	••••••	••••••
25-26	99.74	99.29	99.24	99.30	99.39	•	••••••	••••••	••••••	••••••	••••••
26-27	99.94	99.35	99.43	99.42	99.54	•	••••••	••••••	••••••	••••••	••••••
27-28	100.00	99.48	99.49	99.55	99.63	•	••••••	••••••	••••••	••••••	••••••
28-29	••••••	99.61	99.56	99.62	99.70	•	••••••	••••••	••••••	••••••	••••••
29-30	••••••	99.94	99.68	99.74	99.84	•	••••••	••••••	••••••	••••••	••••••
30-31	••••••	99.94	99.75	99.81	99.87	•	••••••	••••••	••••••	••••••	••••••
31-32	••••••	100.00	99.81	99.81	99.90	•	••••••	••••••	••••••	••••••	••••••
32-33	••••••	••••••	99.94	99.81	99.94	•	••••••	••••••	••••••	••••••	••••••
33-34	••••••	••••••	99.94	99.81	99.94	•	••••••	••••••	••••••	••••••	••••••
34-35	••••••	••••••	99.94	99.81	99.94	•	••••••	••••••	••••••	••••••	••••••
35-36	••••••	••••••	99.94	99.81	99.94	•	••••••	••••••	••••••	••••••	••••••
36-37	••••••	••••••	99.94	99.87	99.95	•	••••••	••••••	••••••	••••••	••••••
37-38	••••••	••••••	100.00	99.87	99.97	•	••••••	••••••	••••••	••••••	••••••
38-39	••••••	••••••	••••••	99.94	99.98	•	••••••	••••••	••••••	••••••	••••••
39-40	••••••	••••••	••••••	99.94	99.98	•	••••••	••••••	••••••	••••••	••••••
40-41	••••••	••••••	••••••	99.94	99.98	•	••••••	••••••	••••••	••••••	••••••
41-42	••••••	••••••	••••••	100.00	100.00	•	••••••	••••••	••••••	••••••	••••••
NOBS	1554	1341	1180	1565	6240	•	236	225	180	194	835

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TABLE 12.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF DEC.

RUNWAY 15 - 33

HRS	CROSSWIND ***** CRITICAL LIMITS IN KNOTS ***** 1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
0-02	49.43	34.92	5.44	2.32	.68	.28	6.92	1764
03-05	50.57	32.77	7.09	1.93	.85	.17	6.63	1764
06-08	47.85	36.85	6.80	1.93	.85	.28	5.44	1764
09-11	26.87	52.49	12.59	4.31	.96	.28	2.49	1764
12-14	19.73	57.37	13.15	5.84	1.25	.23	2.44	1764
15-17	34.13	50.40	10.15	2.89	.85	.11	1.47	1764
18-20	50.23	36.79	6.35	1.02	.23	.11	5.27	1764
21-23	51.53	34.18	5.44	1.36	.23	.28	6.97	1764
00-27	41.29	41.97	8.38	2.70	.74	.22	4.71	14112

TABLE 12.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF DEC.

HRS	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	3.34	2.38	1.25	1764	21.83	34.58	32.37
03-05	4.20	1.76	1.36	1764	25.91	33.16	29.48
06-08	5.39	2.38	1.08	1764	26.42	29.31	[illegible].43
09-11	2.44	4.54	3.00	1764	11.17	22.56	54.76
12-14	.79	5.73	4.37	1764	5.05	20.01	62.64
15-17	1.30	5.16	4.02	1764	7.82	30.95	49.43
18-20	5.84	3.63	1.42	1764	24.04	30.50	31.18
21-23	3.46	1.93	.96	1764	23.98	33.79	32.43
00-27	3.34	3.44	2.18	14112	18.28	29.36	40.59

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TABLE 12.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 0 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.04	.51	.00	.00	.00	.00	2.55	14.46	3.74	.85	1.02	.51	.17	1.53	22.28
5 TO 9	.00	1.36	.51	.34	.00	.00	2.21	33.50	.68	.00	.00	.00	.00	1.36	35.54
10- UP	.00	.00	.85	.34	.00	.17	.00	1.36	1.19	27.21	3.23	.17	.00	.00	.00	31.80
TOTAL	2.04	1.87	1.36	.68	.00	.17	.00	6.12	49.15	31.63	4.08	1.19	.51	.17	2.89	89.63

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 1 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.70	1.87	.00	.00	.00	.00	.00	3.57	13.61	2.72	1.02	1.70	.68	.17	1.02	20.92
5 TO 9	.00	1.02	.51	.68	.00	.00	.00	2.21	33.33	.68	.00	.51	.00	.00	.85	35.37
10- UP	.00	.00	.68	.17	.17	.17	.00	1.19	.51	28.74	3.06	.00	.00	.00	.17	32.48
TOTAL	1.70	2.89	1.19	.85	.17	.17	.00	6.97	47.45	32.14	4.08	2.21	.68	.17	2.04	88.78

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 2 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.55	1.36	.00	.00	.00	.00	.00	3.91	14.80	2.72	1.19	1.19	.51	.00	1.87	22.28
5 TO 9	.00	1.19	1.36	.17	.00	.00	.00	2.72	30.27	1.02	.34	.00	.00	.00	1.19	32.82
10- UP	.00	.00	.51	.34	.17	.17	.00	1.19	.34	29.93	2.21	.34	.00	.00	.00	32.82
TOTAL	2.55	2.55	1.87	.51	.17	.17	.00	7.82	45.41	33.67	3.74	1.53	.51	.00	3.06	87.93

TABLE 12.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 3 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL *	RUNWAY 33 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL
	PERCENTAGES			PERCENTAGES		
1 TO 4	2.55 1.53 .00 .00 .00 .00	.00	4.08 *	15.82 3.06 2.89 .68 .51 .17	1.36	24.49
5 TO 9	.00 .85 1.19 .34 .00 .00	.00	2.38 *	32.14 .51 .51 .17 .00 .00	.85	34.18
10- UP	.00 .00 .85 .34 .00 .17	.00	1.36 *	.69 25.17 3.40 .00 .00 .00	.00	29.25
TOTAL	2.55 2.38 2.04 .68 .00 .17	.00	7.82 *	48.64 28.74 6.80 .85 .51 .17	2.21	87.93

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 4 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL *	RUNWAY 33 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL
	PERCENTAGES			PERCENTAGES		
1 TO 4	1.87 2.38 .00 .00 .00 .00	.00	4.25 *	15.48 3.91 2.72 .85 1.19 .00	1.70	25.85
5 TO 9	.00 .00 .17 .51 .00 .00	.00	.68 *	32.31 .34 .00 .17 .00 .00	.34	33.16
10- UP	.00 .00 .85 .34 .17 .00	.00	1.36 *	.85 26.19 2.55 .00 .00 .00	.68	30.27
TOTAL	1.87 2.38 1.02 .85 .17 .00	.00	6.29 *	48.64 30.44 5.27 1.02 1.19 .00	2.72	89.29

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 5 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL *	RUNWAY 33 CROSSWIND LIMITS (1 TO 4 / 5 TO 9 / 10TO14 / 15TO19 / 20TO24 / 25- UP)	ZERO CROSS	TOTAL
	PERCENTAGES			PERCENTAGES		
1 TO 4	2.21 2.04 .00 .00 .00 .00	.00	4.25 *	16.33 5.44 2.38 1.70 .17 .00	1.36	27.38
5 TO 9	.00 1.02 .68 .17 .34 .00	.00	2.21 *	30.61 .51 .00 .00 .00 .00	1.02	32.14
10- UP	.00 .00 .51 .51 .17 .17	.00	1.36 *	.85 25.34 2.55 .00 .00 .00	.17	28.91
TOTAL	2.21 3.06 1.19 .68 .51 .17	.00	7.82 *	47.79 31.29 4.93 1.70 .17 .00	2.55	88.44

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TABLE 12.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 6 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• • 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.72	3.40	.00	.00	.00	.00	.00	6.12 •	17.86	5.61	2.38	1.02	.51	.17	1.36	28.91
5 TO 9	.00	1.36	.34	.68	.00	.00	.00	2.38 •	25.68	.68	.34	.17	.00	.00	1.36	28.23
10- UP	.00	.00	.17	.34	.17	.00	.00	.68 •	1.36	26.36	2.72	.00	.00	.00	.17	30.61
TOTAL	2.72	4.76	.51	1.02	.17	.00	.00	9.18 •	44.90	32.65	5.44	1.19	.51	.17	2.89	87.76

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 7 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• • 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.23	2.55	.00	.00	.00	.00	.00	5.78 •	17.35	4.25	1.70	1.02	1.02	.17	.85	26.36
5 TO 9	.00	.85	.68	.17	.00	.00	.00	1.70 •	28.74	.51	.17	.17	.00	.00	1.36	30.95
10- UP	.00	.00	.51	.51	.17	.00	.00	1.19 •	1.02	27.21	2.72	.00	.00	.00	.00	30.95
TOTAL	3.23	3.40	1.19	.68	.17	.00	.00	8.67 •	47.11	31.97	4.59	1.19	1.02	.17	2.21	88.27

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 8 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL •	RUNWAY 33 ••• CROSSWIND LIMITS ••• • 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.21	2.04	.00	.00	.00	.00	.00	4.25 •	14.97	3.57	2.72	1.02	.34	.17	1.19	23.98
5 TO 9	.00	1.36	1.02	.34	.34	.00	.00	3.06 •	26.53	.85	.34	.17	.00	.00	.85	28.74
10- UP	.00	.00	.85	.17	.00	.34	.00	1.36 •	1.87	29.93	3.74	.00	.00	.00	.17	35.71
TOTAL	2.21	3.40	1.87	.51	.34	.34	.00	8.67 •	43.37	34.35	6.80	1.19	.34	.17	2.21	88.44

TABLE 12.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 9 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.53	2.72	.00	.00	.00	.00	.17	4.42 *	6.46	3.06	3.57	2.04	.17	.34	.34	15.99
5 TO 9	.00	1.02	1.70	.34	.00	.00	.00	3.06 *	24.49	1.02	.51	.68	.00	.00	.51	27.21
10- UP	.00	.00	1.02	.51	.34	.00	.00	1.87 *	2.89	38.27	4.25	.51	.00	.00	.00	45.92
TOTAL	1.53	3.74	2.72	.85	.34	.00	.17	9.35 *	33.84	42.35	8.33	3.23	.17	.34	.85	89.12

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 10 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.68	1.53	.00	.00	.00	.00	.00	2.21 *	2.04	2.38	2.89	2.04	1.36	.17	.17	11.05
5 TO 9	.00	1.19	2.72	1.02	.00	.00	.00	4.93 *	20.24	.68	.51	.17	.00	.00	.85	22.45
10- UP	.00	.00	1.53	.68	.34	.00	.00	2.55 *	2.55	47.11	5.44	.00	.00	.00	.17	55.27
TOTAL	.68	2.72	4.25	1.70	.34	.00	.00	9.69 *	24.83	50.17	8.84	2.21	1.36	.17	1.19	88.78

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 11 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.00	.68	.00	.00	.00	.00	.00	.68 *	1.02	1.53	1.87	1.70	.34	.00	.00	6.46
5 TO 9	.00	1.53	2.38	1.70	.00	.00	.00	5.61 *	16.50	.51	.51	.17	.00	.00	.34	18.03
10- UP	.00	.00	2.72	1.19	.34	.34	.00	4.59 *	2.21	54.25	6.12	.17	.00	.00	.34	63.10
TOTAL	.00	2.21	5.10	2.89	.34	.34	.00	10.88 *	19.73	56.29	8.50	2.04	.34	.00	.68	87.59

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TABLE 12.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 12 — NUMBER OBS. 598

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 ••• CROSSWIND LIMITS ••• * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES									PERCENTAGES						
1 TO 4	.00	.85	.00	.00	.00	.00	.00	.85 *	.34	1.19	1.87	1.53	.51	.00	.00	5.44
5 TO 9	.00	1.19	2.36	3.06	.17	.00	.00	6.80 *	15.48	1.36	.51	.34	.00	.00	.51	18.20
10- UP	.00	.00	2.55	.68	.68	.17	.00	4.08 *	3.06	52.89	6.29	.68	.00	.17	.00	63.10
TOTAL	.00	2.04	4.93	3.74	.85	.17	.00	11.73 *	18.88	55.44	8.67	2.55	.51	.17	.51	86.73

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 13 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 ••• CROSSWIND LIMITS ••• * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES									PERCENTAGES						
1 TO 4	.00	.51	.00	.00	.00	.00	.00	.51 *	.68	.85	2.21	1.36	.51	.00	.00	5.61
5 TO 9	.00	1.87	1.19	1.70	.34	.00	.00	5.10 *	15.99	.85	.68	.51	.00	.00	.68	18.71
10- UP	.00	.00	3.23	1.19	.68	.00	.00	5.10 *	1.70	54.42	6.46	.34	.17	.17	.34	63.61
TOTAL	.00	2.38	4.42	2.89	1.02	.00	.00	10.71 *	18.37	56.12	9.35	2.21	.68	.17	1.02	87.93

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 14 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 ••• CROSSWIND LIMITS ••• * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES									PERCENTAGES						
1 TO 4	.17	.68	.00	.00	.00	.00	.00	.85 *	.68	.51	.85	1.19	.51	.17	.17	4.08
5 TO 9	.90	1.02	1.70	2.55	.00	.00	.00	5.27 *	19.39	2.04	.68	.51	.00	.00	.51	23.13
10- UP	.00	.00	2.21	1.53	.17	.00	.00	3.91 *	1.70	51.87	6.63	.34	.00	.00	.68	61.22
TOTAL	.17	1.70	3.91	4.08	.17	.00	.00	10.03 *	21.77	54.42	8.16	2.04	.51	.17	1.36	88.44

TABLE 12.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 15 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.00	.68	.00	.00	.00	.00	.00	.68	.68	1.19	.51	.51	.17	.00	.00	3.06
5 TO 9	.00	.68	2.72	1.36	.17	.00	.00	4.93	22.62	1.70	.17	.17	.00	.00	.00	24.66
10- UP	.00	.00	3.23	1.36	.68	.17	.00	5.44	.68	53.57	5.27	.17	.00	.00	.34	60.03
TOTAL	.00	1.36	5.95	2.72	.85	.17	.00	11.05	23.98	56.46	5.95	.85	.17	.00	.34	87.76

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 16 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.17	1.02	.00	.00	.00	.00	.00	1.19	1.70	.51	1.02	.17	.34	.17	.00	3.91
5 TO 9	.00	2.36	1.02	1.36	.17	.00	.00	4.93	29.25	2.89	.68	.34	.00	.00	.00	33.16
10- UP	.00	.00	3.40	.51	.34	.00	.00	4.25	1.02	45.24	5.10	.00	.00	.00	.00	51.36
TOTAL	.17	3.40	4.42	1.87	.51	.00	.00	10.37	31.97	48.64	6.80	.51	.34	.17	.00	88.44

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 17 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL	RUNWAY 33 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	.85	1.19	.00	.00	.00	.00	.00	2.04	12.41	1.87	.85	1.02	.17	.00	.17	16.50
5 TO 9	.00	2.38	2.38	.85	.00	.00	.00	5.61	32.65	2.04	.00	.34	.00	.00	.00	35.03
10- UP	.00	.00	1.36	.51	.51	.00	.00	2.38	.34	33.84	2.72	.00	.00	.00	.00	36.90
TOTAL	.85	3.57	3.74	1.36	.51	.00	.00	10.03	45.41	37.76	3.57	1.36	.17	.00	.17	88.44

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TABLE 12.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 18 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 ••• CROSSWIND LIMITS ••• * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.72	1.70	.00	.00	.00	.00	.00	4.42 *	20.41	3.06	1.02	.17	.00	.00	.68	25.34
5 TO 9	.00	3.23	.85	.34	.00	.00	.00	4.42 *	27.04	1.02	.17	.00	.00	.00	.68	28.91
10- UP	.00	.00	1.02	.51	.34	.00	.00	1.87 *	.00	28.40	3.06	.00	.00	.00	.00	31.46
TOTAL	2.72	4.93	1.87	.85	.34	.00	.00	10.71 *	47.45	32.48	4.25	.17	.00	.00	1.36	85.71

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 19 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 ••• CROSSWIND LIMITS ••• * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	3.91	4.59	.00	.00	.00	.00	.00	8.50 *	17.35	3.06	1.19	.00	.00	.17	2.04	23.81
5 TO 9	.00	1.36	1.19	.17	.00	.00	.00	2.72 *	28.23	1.53	.00	.00	.00	.00	.51	30.27
10- UP	.00	.00	.85	.34	.17	.00	.00	1.36 *	.68	25.51	4.08	.17	.00	.00	.00	30.44
TOTAL	3.91	5.95	2.04	.51	.17	.00	.00	12.59 *	46.26	30.10	5.27	.17	.00	.17	2.55	84.52

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 20 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 ••• CROSSWIND LIMITS ••• 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 ••• CROSSWIND LIMITS ••• * 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	2.55	2.04	.00	.00	.00	.00	.00	4.59 *	17.01	2.89	1.02	.68	.17	.00	1.19	22.96
5 TO 9	.00	2.89	.68	.17	.00	.00	.00	3.74 *	30.10	1.70	.00	.17	.00	.00	.34	32.31
10- UP	.00	.00	.68	.17	.00	.17	.00	1.02 *	.68	27.38	3.23	.17	.00	.00	.17	31.63
TOTAL	2.55	4.93	1.36	.34	.00	.17	.00	9.35 *	47.79	31.97	4.25	1.02	.17	.00	1.70	86.90

TABLE 12.3. (Concluded)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 21 — NUMBER OBS. 598

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.04	1.19	.00	.00	.00	.00	.00	3.23 *	17.18	3.74	1.36	.68	.00	.17	1.87	25.00
5 TO 9	.00	1.19	.51	.00	.00	.00	.00	1.70 *	30.78	.85	.00	.51	.00	.00	1.02	33.16
10- UP	.00	.00	.34	.17	.17	.00	.00	.68 *	1.19	27.72	2.89	.17	.17	.00	.34	32.48
TOTAL	2.04	2.38	.85	.17	.17	.00	.00	5.61 *	49.15	32.31	4.25	1.36	.17	.17	3.23	90.65

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 22 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.70	1.19	.00	.00	.00	.00	.00	2.89 *	16.84	4.08	.51	.68	.17	.17	2.04	24.49
5 TO 9	.00	1.53	.51	.17	.00	.00	.00	2.21 *	31.29	.34	.17	.17	.00	.00	1.53	33.50
10- UP	.00	.00	.68	.17	.00	.17	.00	1.02 *	1.36	27.55	3.23	.17	.00	.00	.51	32.82
TOTAL	1.70	2.72	1.19	.34	.00	.17	.00	6.12 *	49.49	31.97	3.91	1.02	.17	.17	4.08	90.82

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF DEC.

HOUR 23 — NUMBER OBS. 588

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.89	1.36	.00	.00	.00	.00	.00	4.25 *	15.65	3.23	1.02	.68	.17	.17	1.53	22.45
5 TO 9	.00	1.19	.68	.00	.00	.00	.00	1.87 *	31.97	.68	.17	.34	.00	.00	1.53	34.69
10- UP	.00	.00	1.02	.00	.00	.17	.00	1.19 *	1.70	26.70	3.23	.17	.00	.00	.17	31.97
TOTAL	2.89	2.55	1.70	.00	.00	.17	.00	7.31 *	49.32	30.61	4.42	1.19	.17	.17	3.23	89.12

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TABLE 12.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — HEAD/TAIL WIND REVERSALS
MONTH OF DEC.

	*** RUNWAY 15 ***					*** RUNWAY 33 ***				
				GIVEN A HEAD WIND	GIVEN A TAIL WIND				GIVEN A HEAD WIND	GIVEN A TAIL WIND
HRS	PERCNTAGE REVERSALS TOTAL	PERCNTAGE REVERSALS HEAD-TAIL	PERCNTAGE REVERSALS TAIL-HEAD	PERCNTAGE REVERSALS TO TAIL	PERCNTAGE REVERSALS TO HEAD	PERCNTAGE REVERSALS TOTAL	PERCNTAGE REVERSALS HEAD-TAIL	PERCNTAGE REVERSALS TAIL-HEAD	PERCNTAGE REVERSALS TO TAIL	PERCNTAGE REVERSALS TO HEAD
00-02	6.59	3.58	3.01	3.85	43.09	8.63	4.03	4.60	35.86	5.18
03-05	7.04	3.75	3.29	4.04	44.96	6.52	4.26	4.26	37.13	4.81
06-08	8.46	4.26	4.20	4.67	47.44	10.16	5.28	4.88	44.93	5.53
09-11	11.93	6.36	5.57	7.07	55.68	12.61	5.91	6.70	51.23	7.57
12-14	10.79	5.28	5.51	5.92	50.79	11.13	5.74	5.39	46.54	6.15
15-17	10.34	5.11	5.22	5.71	49.73	11.24	5.28	5.96	44.71	6.76
18-20	8.18	3.24	4.94	3.63	45.31	9.94	5.79	4.15	40.48	4.84
21-23	6.64	3.41	3.24	3.64	50.89	8.63	4.15	4.49	42.20	4.97
00-23	8.75	4.37	4.37	4.80	48.73	10.11	5.05	5.05	42.89	5.73

12.4A

KSC PEAK WINDS — HEADWIND TO TAILWIND REVERSALS
MONTH OF DEC.

	*** RUNWAY 15 ***				*** RUNWAY 33 ***			
	GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE				GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE			
HRS	>0 - 3	4 - 8	> 8	TOTAL	>0 - 3	4 - 8	> 8	TOTAL
00-02	1.71	1.77	.37	3.85	17.17	9.60	9.09	35.86
03-05	2.63	.92	.49	4.04	21.29	9.90	5.94	37.13
06-08	2.12	1.81	.75	4.67	17.87	14.49	12.56	44.93
09-11	.50	3.97	2.59	7.07	10.84	9.85	30.54	51.23
12-14	.13	2.68	3.12	5.92	9.68	3.69	33.18	46.54
15-17	1.14	2.66	1.90	5.71	13.46	8.65	22.60	44.71
18-20	1.59	1.91	.13	3.63	20.63	11.51	8.33	40.48
21-23	1.88	1.03	.73	3.64	21.39	10.98	9.83	42.20
00-23	1.47	2.08	1.25	4.80	16.51	9.82	16.57	42.89

12.4B

TABLE 12.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

~~NSC PEAK WINDS~~ — HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF DEC.

RUNWAY COMPONENT CLASS	••• RUNWAY 15 •••						••• RUNWAY 33 •••				
~~KNOTS~~	~~HOURS 06-08~~	~~HOURS 09-11~~	~~HOURS 12-14~~	~~HOURS 15-17~~	~~HOURS 06-17~~	~~HOURS 06-08~~	~~HOURS 09-11~~	~~HOURS 12-14~~	~~HOURS 15-17~~	~~HOURS 06-17~~
	CPF	CPF	CPF	CPF	CPF	CPF	CPF	CPF	CPF	CPF
0- 1	9.89	4.35	2.42	2.41	4.79	25.36	14.29	11.98	11.06	15.65
1- 2	14.37	9.70	5.79	3.93	8.48	31.58	16.26	11.98	11.06	17.68
2- 3	18.03	10.58	6.29	5.00	10.02	51.20	21.18	12.44	13.94	24.61
~~3- 4~~	~~26.62~~	~~11.96~~	~~6.79~~	~~6.98~~	~~13.12~~	~~62.20~~	~~28.09~~	~~13.02~~	~~16.83~~	~~30.11~~
4- 5	32.28	14.11	7.31	10.20	16.05	70.81	34.48	17.97	22.12	36.20
5- 6	40.61	17.63	9.65	14.31	20.40	79.43	47.29	26.73	37.50	47.55
6- 7	45.90	21.66	11.19	18.62	24.45	81.36	56.65	32.26	41.35	52.69
7- 8	51.79	25.88	15.19	24.64	29.47	84.21	64.04	46.08	51.44	61.29
8- 9	55.97	29.85	18.94	30.27	33.87	87.56	69.46	56.22	56.73	67.38
9-10	64.43	39.17	29.75	44.78	44.63	90.91	73.89	64.52	65.87	73.72
10-11	69.03	45.28	36.04	52.12	50.93	93.30	78.82	69.12	70.67	77.90
11-12	72.89	50.69	43.23	58.64	56.44	93.78	84.24	73.27	75.00	81.48
12-13	77.36	58.50	52.39	66.18	63.67	94.26	89.16	79.26	81.25	85.90
13-14	80.22	63.16	58.23	70.80	68.16	96.17	91.13	82.03	84.62	88.41
14-15	83.15	70.47	65.23	76.76	73.94	96.65	92.12	88.94	91.35	92.23
15-16	86.38	76.76	71.65	81.39	79.08	96.65	94.58	91.24	93.27	93.91
16-17	89.24	80.86	77.11	85.31	83.16	98.09	96.55	94.93	96.15	96.42
17-18	91.42	84.19	82.07	87.71	86.31	98.56	98.52	97.24	96.63	97.73
18-19	94.40	89.23	86.46	91.07	90.31	99.04	98.52	97.70	97.12	98.09
19-20	96.39	93.14	91.61	95.06	94.06	99.52	99.51	98.16	98.08	98.81
20-21	96.95	94.58	93.64	96.01	95.31	99.52	99.51	98.62	98.08	98.92
21-22	97.61	96.28	95.55	97.02	96.60	100.00	99.51	100.00	99.04	99.64
22-23	98.20	97.17	96.31	97.53	97.31	••••••	100.00	••••••	100.00	100.00
23-24	99.00	98.11	97.08	98.04	98.06	••••••	••••••	••••••	••••••	••••••
24-25	99.25	98.61	97.52	98.73	98.53	••••••	••••••	••••••	••••••	••••••
25-26	99.50	98.93	98.29	98.86	98.90	••••••	••••••	••••••	••••••	••••••
26-27	99.56	99.12	98.86	99.18	99.18	••••••	••••••	••••••	••••••	••••••
~~27-28~~	~~99.63~~	~~99.56~~	~~99.24~~	~~99.49~~	~~99.48~~	••••••	••••••	••••••	••••••	••••••
28-29	99.81	99.56	99.49	99.75	99.65	••••••	••••••	••••••	••••••	••••••
29-30	99.88	99.69	99.75	99.87	99.80	••••••	••••••	••••••	••••••	••••••
30-31	100.00	99.81	99.81	99.94	99.89	••••••	••••••	••••••	••••••	••••••
31-32	••••••	99.87	99.81	100.00	99.92	••••••	••••••	••••••	••••••	••••••
32-33	••••••	99.94	99.87	••••••	99.95	••••••	••••••	••••••	••••••	••••••
~~33-34~~	••••••	~~99.97~~	~~99.94~~	••••••	99.97	••••••	••••••	••••••	••••••	••••••
34-35	••••••	99.94	99.94	••••••	99.97	••••••	••••••	••••••	••••••	••••••
35-36	••••••	99.94	100.00	••••••	99.98	••••••	••••••	••••••	••••••	••••••
36-37	••••••	100.00	••••••	••••••	100.00	••••••	••••••	••••••	••••••	••••••
NOBS	1608	1588	1573	1579	6348	209	207	217	208	837

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TABLE 13.1. HOURLY KENNEDY SPACE CENTER, FLORIDA, CROSSWIND PERCENTAGE FREQUENCIES FOR SPACE SHUTTLE RUNWAY 15-33

KSC PEAK WINDS CROSSWINDS
MONTH OF ANNUAL

RUNWAY 15 - 33

HRS	CROSSWIND ***** CRITICAL LIMITS IN KNOTS ***** 1 TO 4	5 TO 9	10 TO 14	15 TO 19	20 TO 24	25 ABOVE	ZERO CROSSWIND	TOTAL NUMBER OBS.
	PERCENTAGES							
00-02	56.70	29.16	4.05	1.28	.35	.10	8.35	19990
03-05	58.82	25.77	4.22	1.47	.39	.09	9.24	19992
06-08	52.45	32.71	5.27	1.46	.53	.17	7.69	19997
09-11	29.60	54.60	9.31	3.04	.76	.25	3.44	19992
12-14	16.17	66.37	10.72	3.08	.94	.40	2.33	19995
15-17	23.22	61.09	10.27	2.25	.71	.30	2.26	19994
18-20	49.36	40.11	5.35	1.24	.35	.11	4.50	19993
21-23	54.74	32.56	4.17	1.04	.27	.11	7.15	19990
00-23	42.48	42.71	6.66	1.86	.54	.18	5.57	159938

TABLE 13.2. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS TAILWINDS
MONTH OF ANNUAL

HRS	RUNWAY 15 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE	TOTAL NUMBER OBS.	RUNWAY 33 TAILWIND CRITICAL LIMITS IN KNOTS 1 TO 4	5 TO 9	10 ABOVE
	PERCENTAGES				PERCENTAGES		
00-02	2.62	1.41	.67	19990	25.84	38.10	27.36
03-05	3.29	1.43	.76	19992	31.10	35.40	23.10
06-08	3.69	1.94	.85	19992	25.38	34.85	29.42
09-11	1.09	3.18	1.88	19992	6.22	28.68	56.83
12-14	.21	2.13	2.32	19995	2.13	18.07	73.20
15-17	.36	1.76	2.12	19994	3.27	24.49	66.78
18-20	2.15	2.08	1.19	19993	16.14	37.15	38.68
21-23	2.70	1.66	.72	19990	22.27	37.63	31.60
00-23	2.01	1.93	1.31	159938	16.54	31.90	43.28

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TABLE 13.3. HOURLY KENNEDY SPACE CENTER, FLORIDA, TAILWIND-VERSUS-CROSSWIND PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 0 — NUMBER OBS. 6663

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.49	.99	.00	.00	.00	.00	.00	2.48 *	19.14	2.25	.47	.27	.23	.06	2.12	24.52
5 TO 9	.00	.65	.35	.29	.17	.06	.00	1.29 *	34.11	1.58	.39	.17	.00	.00	1.97	38.21
10- UP	.00	.00	.32	.14	.09	.03	.00	.56 *	1.28	25.08	2.48	.14	.03	.03	.17	29.19
TOTAL	1.49	1.64	.66	.42	.09	.03	.00	4.32 *	54.52	29.91	3.33	.57	.26	.09	4.25	91.93

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 1 — NUMBER OBS. 6663

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.44	.90	.60	.66	.20	.05	.00	2.34 *	19.57	2.63	.59	.50	.20	.05	2.30	25.77
5 TO 9	.00	.72	.42	.36	.02	.00	.00	1.52 *	34.49	1.61	.39	.15	.00	.00	1.79	38.42
10- UP	.00	.00	.38	.18	.09	.03	.00	.68 *	1.10	23.43	2.21	.18	.06	.03	.14	27.13
TOTAL	1.44	1.62	.60	.54	.11	.03	.00	4.53 *	55.11	27.66	3.18	.83	.26	.08	4.22	91.33

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 2 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.01	.96	.60	.00	.00	.00	.06	3.03 *	20.66	2.64	.59	.50	.24	.02	2.60	27.24
5 TO 9	.00	.60	.41	.39	.03	.00	.00	1.43 *	33.88	1.44	.42	.14	.02	.00	1.77	37.67
10- UP	.00	.00	.38	.32	.05	.03	.00	.77 *	.99	22.01	2.40	.15	.02	.03	.15	25.75
TOTAL	2.01	1.56	.78	.71	.08	.03	.06	5.22 *	55.54	26.10	3.41	.78	.27	.05	4.52	90.65

TABLE 13.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 3 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.86	1.10	.00	.00	.00	.00	.05	3.00 *	21.84	2.81	.84	.42	.26	.11	3.02	29.31
5 TO 9	.00	.62	.57	.38	.03	.00	.00	1.59 *	33.76	1.26	.33	.21	.00	.00	1.46	37.02
10- UP	.00	.00	.36	.15	.11	.03	.00	.63 *	.89	20.30	2.19	.21	.03	.02	.08	23.71
TOTAL	1.86	1.71	.93	.53	.14	.02	.05	5.22 *	56.51	24.37	3.36	.84	.29	.12	4.55	90.04

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 4 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.12	1.25	.00	.00	.00	.00	.05	3.41 *	23.60	3.02	.99	.50	.30	.03	2.64	31.08
5 TO 9	.00	.60	.41	.30	.00	.00	.00	1.31 *	33.07	1.04	.32	.18	.00	.00	1.02	35.62
10- UP	.00	.00	.36	.32	.06	.00	.00	.74 *	.86	19.73	2.09	.21	.03	.02	.15	23.08
TOTAL	2.12	1.85	.77	.62	.06	.00	.05	5.45 *	57.53	23.78	3.39	.89	.33	.05	3.81	89.78

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 5 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.21	1.25	.00	.00	.00	.00	.00	3.45 *	24.56	3.48	.92	.62	.18	.05	3.12	32.92
5 TO 9	.00	.62	.50	.24	.05	.00	.00	1.40 *	30.84	1.10	.18	.18	.00	.00	1.26	33.57
10- UP	.00	.00	.45	.32	.11	.03	.00	.90 *	.84	19.16	2.16	.20	.03	.02	.12	22.52
TOTAL	2.21	1.86	.95	.56	.15	.03	.00	5.75 *	56.24	23.74	3.26	.99	.21	.06	4.52	89.02

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TABLE 13.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 6 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.54	1.46	.00	.00	.00	.00	.03	4.02 *	24.55	3.56	.95	.50	.27	.06	3.29	33.16
5 TO 9	.00	.72	.42	.30	.05	.00	.00	1.49 *	29.31	1.10	.36	.17	.00	.00	1.34	32.76
10- UP	.00	.00	.33	.24	.11	.00	.00	.68 *	.90	19.58	2.25	.12	.08	.00	.14	23.06
TOTAL	2.54	2.18	.75	.54	.15	.00	.03	6.18 *	54.76	24.23	3.56	.78	.35	.06	4.76	88.49

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 7 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	2.28	1.68	.30	.10	.05	.05	.02	3.98 *	17.99	3.93	1.11	.57	.29	.03	2.27	26.19
5 TO 9	.00	.75	.56	.33	.02	.00	.00	1.65 *	33.24	1.08	.48	.11	.00	.00	1.17	36.07
10- UP	.00	.00	.54	.29	.11	.02	.00	.95 *	1.14	23.47	2.31	.12	.05	.00	.12	27.21
TOTAL	2.28	2.43	1.10	.62	.12	.02	.02	6.57 *	52.37	28.48	3.90	.80	.33	.03	3.56	89.47

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 8 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.43	1.65	.00	.00	.00	.00	.00	3.08 *	9.39	3.60	1.50	.62	.29	.14	1.16	16.79
5 TO 9	.00	.96	.87	.48	.06	.00	.00	2.37 *	32.40	1.52	.78	.14	.02	.00	1.38	36.22
10- UP	.00	.00	.54	.23	.11	.05	.00	.92 *	1.58	33.07	2.82	.18	.08	.02	.26	38.00
TOTAL	1.43	2.61	1.41	.71	.17	.05	.00	6.36 *	43.37	38.19	5.10	.93	.48	.15	2.79	91.01

TABLE 13.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF ANNUAL

HOUR 9 — NUMBER OBS. 6663

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP			1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.66	1.34	.00	.00	.00	.00	.02	2.01	3.68	2.57	1.32	.84	.36	.12	.26	9.26
5 TO 9	.00	1.14	1.19	.74	.15	.00	.00	3.09	29.84	1.38	1.02	.41	.00	.00	.89	33.53
10- UP	.00	.00	.95	.42	.17	.05	.02	1.53	2.01	41.67	3.96	.32	.05	.02	.26	48.48
TOTAL	.66	2.48	2.13	1.16	.32	.05	.02	6.63	35.64	45.82	6.30	1.56	.41	.14	1.40	91.27

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF ANNUAL

HOUR 10 — NUMBER OBS. 6665

TAILWIND LIMITS	RUNWAY 15 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP			1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.23	.65	.00	.00	.00	.00	.00	.90	1.49	1.65	1.19	.92	.39	.14	.05	5.81
5 TO 9	.00	1.05	1.32	1.16	.02	.00	.00	3.54	25.43	1.38	.99	.44	.02	.00	.48	29.73
10- UP	.00	.00	.95	.62	.23	.08	.00	1.86	2.30	49.08	5.04	.23	.05	.06	.18	56.92
TOTAL	.23	1.73	2.27	1.77	.24	.08	.00	6.30	29.21	52.11	7.22	1.58	.45	.20	.71	91.46

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS — MONTH OF ANNUAL

HOUR 11 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL	RUNWAY 33 CROSSWIND LIMITS (PERCENTAGES)						ZERO CROSS	TOTAL
	1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP			1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP		
1 TO 4	.08	.27	.00	.00	.00	.00	.00	.35	.60	.95	.90	.68	.36	.09	.02	3.59
5 TO 9	.00	.74	1.02	1.02	.14	.00	.00	2.91	20.36	1.53	1.05	.39	.03	.00	.41	23.77
10- UP	.00	.00	1.20	.66	.29	.09	.00	2.24	2.03	56.38	5.84	.32	.20	.11	.23	65.08
TOTAL	.08	1.01	2.22	1.68	.42	.09	.00	5.49	22.99	58.85	7.79	1.38	.59	.20	.65	92.44

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TABLE 13.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 12 — NUMBER OBS. 6665

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.05	.18	.09	.00	.00	.00	.00	.23 *	.41	.51	.56	.62	.35	.14	.00	2.57
5 TO 9	.00	.57	.77	.96	.08	.00	.00	2.37 *	15.98	2.21	.56	.54	.03	.00	.29	19.59
10- UP	.00	.00	1.26	.69	.32	.17	.00	2.43 *	1.70	60.90	7.35	.50	.12	.09	.09	70.74
TOTAL	.05	.75	2.03	1.65	.39	.17	.00	5.03 *	18.08	63.62	8.46	1.65	.50	.23	.38	92.90

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 13 — NUMBER OBS. 6665

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.02	.20	.00	.00	.00	.00	.00	.21 *	.29	.39	.50	.44	.27	.06	.00	1.94
5 TO 9	.00	.45	.65	.84	.11	.00	.00	2.04 *	14.58	2.12	.51	.42	.05	.00	.32	17.99
10- UP	.00	.00	1.07	.74	.41	.14	.00	2.34 *	.93	63.51	8.15	.59	.15	.20	.06	73.58
TOTAL	.02	.65	1.71	1.58	.51	.14	.00	4.59 *	15.80	66.02	9.15	1.44	.47	.26	.38	93.50

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 14 — NUMBER OBS. 6665

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.03	.15	.00	.00	.00	.00	.00	.18 *	.45	.30	.27	.44	.23	.12	.08	1.88
5 TO 9	.00	.60	.42	.84	.12	.00	.00	1.98 *	13.20	2.43	.26	.44	.09	.00	.21	16.62
10- UP	.00	.00	.98	.68	.39	.14	.00	2.18 *	.90	64.61	8.88	.53	.14	.15	.08	75.27
TOTAL	.03	.75	1.40	1.52	.51	.14	.00	4.34 *	14.55	67.34	9.41	1.40	.45	.27	.36	93.77

TABLE 13.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 15 — NUMBER OBS. 6665

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.03	.20	.00	.00	.00	.00	.00	.23 *	.48	.39	.26	.33	.21	.09	.08	1.83
5 TO 9	.00	.47	.59	.60	.11	.00	.00	1.76 *	15.87	2.70	.36	.39	.08	.00	.20	19.59
10- UP	.00	.00	1.04	.66	.47	.12	.00	2.28 *	.60	61.91	8.94	.71	.12	.11	.08	72.45
TOTAL	.03	.66	1.62	1.26	.57	.12	.00	4.26 *	16.95	65.00	9.56	1.43	.41	.20	.35	93.88

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 16 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.07	.33	.00	.00	.00	.00	.00	.36 *	1.19	.30	27	.26	.20	.06	.09	2.36
5 TO 9	.00	.51	.45	.59	.11	.00	.00	1.65 *	19.91	3.06	.42	.30	.02	.00	.11	23.81
10- UP	.00	.00	1.23	.65	.27	.12	.00	2.27 *	.62	58.00	8.36	.46	.06	.14	.02	67.66
TOTAL	.03	.84	1.68	1.23	.38	.12	.00	4.28 *	21.71	61.36	9.05	1.04	.27	.20	.21	93.83

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 17 — NUMBER OBS. 6665

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.24	.32	.00	.00	.00	.00	.00	.56 *	4.01	.71	.27	.23	.12	.09	.20	5.61
5 TO 9	.00	.68	.62	.54	.03	.00	.00	1.86 *	26.02	3.18	.42	.20	.02	.00	.24	30.07
10- UP	.00	.00	.99	.48	.29	.06	.00	1.82 *	.66	50.26	6.60	.36	.06	.12	.06	58.12
TOTAL	.24	.99	1.61	1.02	.32	.06	.00	4.23 *	30.68	54.15	7.29	.78	.20	.21	.50	93.80

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TABLE 13.3. (Continued)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 18 — NUMBER OBS. 6665

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	.95	.65	.00	.00	.00	.00	.00	1.59 *	9.30	.95	.24	.23	.08	.02	.74	11.54
5 TO 9	.00	.98	.56	.39	.03	.00	.00	1.95 *	30.11	3.69	.37	.12	.00	.01	.44	34.66
10- UP	.00	.00	.90	.38	.29	.06	.00	1.62 *	.51	40.68	4.43	.30	.06	.06	.12	46.15
TOTAL	.95	1.62	1.46	.77	.32	.06	.00	5.16 *	39.92	45.31	4.97	.65	.14	.08	1.29	92.35

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 19 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.56	.96	.00	.00	.00	.00	.00	2.52 *	13.70	1.20	.32	.12	.08	.05	1.14	16.60
5 TO 9	.00	1.11	.50	.45	.03	.00	.00	2.09 *	34.65	3.08	.27	.21	.00	.00	.87	39.08
10- UP	.00	.00	.65	.24	.14	.03	.00	1.05 *	.77	31.97	3.17	.20	.02	.02	.08	36.10
TOTAL	1.56	2.07	1.14	.69	.17	.03	.00	5.66 *	49.11	36.15	3.75	.53	.09	.06	2.09	91.78

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 20 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES							*	PERCENTAGES							
1 TO 4	1.44	.89	.00	.00	.00	.00	.02	2.34 *	17.05	1.29	.38	.23	.12	.02	1.22	20.29
5 TO 9	.00	1.37	.48	.33	.02	.00	.00	2.19 *	34.09	2.25	.32	.14	.00	.00	.92	37.71
10- UP	.00	.00	.54	.20	.11	.05	.00	.89 *	.95	29.38	3.02	.20	.09	.03	.12	33.78
TOTAL	1.44	2.25	1.02	.53	.12	.05	.02	5.42 *	52.09	32.92	3.71	.56	.21	.05	2.25	91.78

TABLE 13.3. (Concluded)

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 21 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.76	.83	.00	.00	.00	.00	.02	2.60 *	17.42	1.56	.44	.29	.12	.05	1.76	21.62
5 TO 9	.00	1.22	.41	.26	.02	.00	.00	1.89 *	33.79	2.18	.27	.27	.00	.00	1.19	37.61
10- UP	.00	.00	.42	.23	.11	.02	.02	.77 *	1.17	28.18	2.67	.16	.02	.01	.17	32.38
TOTAL	1.76	2.04	.83	.48	.12	.02	.02	5.25 *	52.37	31.92	3.26	.74	.14	.06	3.11	91.58

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 22 — NUMBER OBS. 6662

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.88	.77	.00	.00	.00	.00	.00	2.64 *	17.77	1.73	.38	.26	.11	.06	2.04	22.34
5 TO 9	.00	.95	.47	.21	.03	.00	.00	1.65 *	33.61	1.86	.17	.14	.02	.00	1.56	37.36
10- UP	.00	.00	.38	.14	.03	.03	.00	.57 *	1.29	27.36	2.67	.18	.05	.05	.26	31.85
TOTAL	1.88	1.71	.84	.35	.06	.03	.00	4.86 *	52.67	30.95	3.21	.57	.17	.11	3.87	91.55

KSC PEAK WINDS — TAILWINDS VS CROSSWINDS
MONTH OF ANNUAL

HOUR 23 — NUMBER OBS. 6664

TAILWIND LIMITS	RUNWAY 15 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL *	RUNWAY 33 *** CROSSWIND LIMITS *** 1 TO 4	5 TO 9	10TO14	15TO19	20TO24	25- UP	ZERO CROSS	TOTAL
	PERCENTAGES								PERCENTAGES							
1 TO 4	1.98	.87	.00	.00	.00	.00	.02	2.87 *	18.01	1.76	.41	.20	.23	.05	2.22	22.85
5 TO 9	.00	.72	.44	.26	.02	.00	.00	1.43 *	34.06	1.71	.36	.14	.02	.00	1.65	37.94
10- UP	.00	.00	.45	.20	.06	.05	.00	.75 *	1.50	26.01	2.58	.21	.02	.03	.26	30.60
TOTAL	1.99	1.59	.89	.45	.08	.05	.02	5.04 *	53.57	29.47	3.35	.54	.26	.08	4.13	91.39

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TABLE 13.4. HOURLY KENNEDY SPACE CENTER, FLORIDA, WIND REVERSAL PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — HEAD/TAIL WIND REVERSALS
MONTH OF ANNUAL

*** RUNWAY 15 ***

HRS	PERCNTAGE REVERSALS TOTAL	PERCNTAGE REVERSALS HEAD-TAIL	PERCNTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCNTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCNTAGE REVERSALS TO HEAD
00-02	4.71	2.51	2.20	2.63	47.01
03-05	5.61	2.96	2.65	3.13	48.35
06-08	7.26	3.70	3.55	3.96	55.78
09-11	6.77	3.12	3.65	3.32	54.56
12-14	4.60	2.17	2.43	2.28	52.16
15-17	4.28	2.29	1.99	2.39	46.82
18-20	4.83	2.43	2.40	2.57	44.39
21-23	4.81	2.25	2.56	2.37	50.64
00-23	5.36	2.68	2.68	2.83	51.00

*** RUNWAY 33 ***

PERCNTAGE REVERSALS TOTAL	PERCNTAGE REVERSALS HEAD-TAIL	PERCNTAGE REVERSALS TAIL-HEAD	GIVEN A HEAD WIND PERCNTAGE REVERSALS TO TAIL	GIVEN A TAIL WIND PERCNTAGE REVERSALS TO HEAD
7.02	3.19	3.82	36.67	4.19
8.54	4.02	4.52	38.65	5.05
9.42	5.17	4.24	50.02	4.73
7.12	3.83	3.29	46.30	3.58
4.84	2.58	2.26	39.04	2.42
4.63	2.06	2.57	33.39	2.73
5.80	2.77	3.03	34.50	3.29
7.04	3.58	3.46	42.13	3.78
6.80	3.40	3.40	40.59	3.71

13.4A

KSC PEAK WINDS — HEADWIND TO TAILWIND REVERSALS
MONTH OF ANNUAL

*** RUNWAY 15 ***

HRS	GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL
00-02	1.39	.91	.33	2.63
03-05	1.87	.90	.37	3.13
06-08	1.54	1.77	.65	3.96
09-11	.22	1.71	1.38	3.32
12-14	.06	.88	1.34	2.28
15-17	.38	.99	1.03	2.39
18-20	1.01	1.05	.51	2.57
21-23	1.19	.81	.37	2.37
00-23	.96	1.12	.75	2.83

*** RUNWAY 33 ***

GIVEN A HEADWIND RESULTANT TAILWIND MAGNITUDE >0 - 3	4 - 8	> 8	TOTAL
19.00	11.00	6.68	36.67
22.55	9.93	6.17	38.65
19.00	17.45	13.57	50.02
8.67	6.48	31.15	46.30
6.52	2.20	30.33	39.04
6.58	5.52	21.28	33.39
13.97	9.98	10.54	34.50
20.74	13.26	8.13	42.13
15.52	10.06	15.01	40.59

13.4B

TABLE 13.5. KENNEDY SPACE CENTER, FLORIDA, HEADWIND COMPONENT CUMULATIVE PERCENTAGE FREQUENCIES BY RUNWAY END

KSC PEAK WINDS — HEADWIND CUMULATIVE PERCENTAGE FREQUENCY
MONTH OF ANNUAL

RUNWAY COMPONENT CLASS (KNOTS)	*** RUNWAY 15 *** HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF	*	*** RUNWAY 33 *** HOURS 06-08 CPF	HOURS 09-11 CPF	HOURS 12-14 CPF	HOURS 15-17 CPF	HOURS 06-17 CPF
0- 1	8.37	3.58	2.29	2.26	4.10	*	39.12	25.90	29.65	30.93	32.03
1- 2	12.16	5.81	3.37	2.99	6.05	*	44.73	26.53	29.60	31.17	34.08
2- 3	16.53	6.48	3.70	3.51	7.51	*	59.14	29.31	30.28	32.47	39.96
3- 4	24.70	7.58	3.90	4.34	10.07	*	66.68	33.35	30.89	34.25	43.99
4- 5	31.35	8.90	4.28	5.40	12.40	*	74.08	38.91	32.72	37.09	48.84
5- 6	40.57	11.91	5.19	7.77	16.26	*	79.98	42.24	37.85	44.24	55.99
6- 7	46.71	15.19	6.27	10.28	19.50	*	82.93	55.35	42.39	47.56	60.18
7- 8	53.00	19.92	8.43	14.07	23.71	*	86.51	62.11	49.13	53.25	65.68
8- 9	58.48	25.51	11.78	18.29	28.38	*	89.46	69.49	57.08	59.33	71.46
9-10	68.58	39.45	23.23	30.99	40.43	*	91.83	77.34	64.95	65.58	77.20
10-11	73.86	46.39	32.58	39.61	48.49	*	93.57	81.27	69.80	69.89	80.66
11-12	77.59	55.43	41.30	46.97	55.14	*	94.29	83.81	73.23	74.19	83.14
12-13	81.90	63.96	52.24	57.17	63.73	*	95.36	87.37	79.18	81.09	87.05
13-14	84.62	69.16	58.97	63.46	68.97	*	95.99	89.24	81.91	83.69	88.83
14-15	87.44	75.14	66.82	70.34	74.87	*	97.20	92.33	87.59	87.99	92.08
15-16	89.77	79.70	72.95	75.33	79.39	*	97.73	94.50	90.61	90.42	93.95
16-17	91.61	83.75	78.36	80.22	83.44	*	98.84	96.92	94.17	94.64	96.53
17-18	93.17	86.54	82.26	83.67	86.36	*	98.98	97.82	95.64	95.37	97.31
18-19	94.96	90.55	86.92	87.97	90.07	*	99.27	98.61	96.74	96.19	97.96
19-20	96.91	94.22	91.89	92.48	93.86	*	99.66	99.34	98.18	97.65	98.87
20-21	97.52	95.49	93.57	93.99	95.13	*	99.76	99.46	98.71	97.89	99.39
21-22	98.27	96.88	95.27	95.54	96.46	*	99.95	99.70	99.24	98.78	99.51
22-23	98.55	97.52	96.06	96.34	97.11	*	100.00	99.82	99.55	99.43	99.75
23-24	98.92	98.12	97.19	97.36	97.89	*	******	99.82	99.55	99.51	99.76
24-25	99.14	98.59	97.81	97.96	98.37	*	******	99.88	99.62	99.92	99.87
25-26	99.35	98.92	98.32	98.42	98.75	*	******	99.94	99.85	99.92	99.94
26-27	99.49	99.16	98.73	98.78	99.04	*	******	99.94	100.00	99.92	99.97
27-28	99.59	99.38	99.04	99.10	99.28	*	******	100.00	******	99.92	99.98
28-29	99.67	99.48	99.20	99.28	99.41	*	******	******	******	99.92	99.94
29-30	99.78	99.66	99.52	99.54	99.62	*	******	******	******	99.92	99.98
30-31	99.85	99.76	99.65	99.64	99.72	*	******	******	******	100.00	100.00
31-32	99.87	99.82	99.72	99.69	99.77	*	******	******	******	******	******
32-33	99.89	99.86	99.78	99.77	99.82	*	******	******	******	******	******
33-34	99.91	99.87	99.82	99.81	99.85	*	******	******	******	******	******
34-35	99.93	99.89	99.85	99.86	99.88	*	******	******	******	******	******
35-36	99.94	99.91	99.89	99.87	99.90	*	******	******	******	******	******
36-37	99.95	99.94	99.92	99.91	99.93	*	******	******	******	******	******
37-38	99.96	99.95	99.93	99.93	99.94	*	******	******	******	******	******
38-39	99.96	99.96	99.96	99.96	99.96	*	******	******	******	******	******

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TABLE 13.5. (Concluded)

39-40	99.97	99.97	99.97	99.96	99.97	* ******	******	******	******	******
40-41	99.97	99.97	99.97	99.96	99.97	* ******	******	******	******	******
41-42	99.97	99.98	99.97	99.97	99.98	* ******	******	******	******	******
42-43	99.98	99.99	99.97	95.97	99.98	* ******	******	******	******	******
43-44	99.99	99.99	99.98	99.97	99.98	* ******	******	******	******	******
44-45	99.99	99.99	99.98	99.97	99.98	* ******	******	******	******	******
45-46	99.99	100.00	99.98	99.98	99.99	* ******	******	******	******	******
46-47	100.00	******	99.98	99.99	99.99	* ******	******	******	******	******
47-48	******	******	99.98	99.99	99.99	* ******	******	******	******	******
48-49	******	******	99.99	99.99	99.99	* ******	******	******	******	******
49-50	******	******	99.99	99.99	100.00	* ******	******	******	******	******
50-51	******	******	100.00	99.99	100.00	* ******	******	******	******	******
51-52	******	******	******	99.99	100.00	* ******	******	******	******	******
52-53	******	******	******	99.99	100.00	* ******	******	******	******	******
53-54	******	******	******	99.99	100.00	* ******	******	******	******	******
54-55	******	******	******	100.00	100.00	* ******	******	******	******	******
NOBS	18718	18764	19065	19143	75690	* 2068	1655	1321	1232	6276

APPROVAL

GROUND WINDS FOR KENNEDY SPACE CENTER, FLORIDA (1978 VERSION)

By D. L. Johnson and S. C. Brown

The information in this report has been reviewed for technical content. Review of any information concerning Department of Defense or nuclear energy activities or programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

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